

## Classification of the Soil Mites of the Family Suctobelbidae (Oribatida) of Japan

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**Abstract** Species of the family Suctobelbidae (Acari: Oribatida) of Japan were arranged and recorded and a phylogenetic survey made of the genera of this family worldwide. In Japan, the family Suctobelbidae contains 59 species and three subspecies belonging to 10 genera. Of the species dealt with here, four genera, 41 species and one subspecies are newly described and six species are newly recorded from Japan. The phylogenetic relationships of the 20 worldwide genera were also constructed. From the distributional patterns of these genera, it is conjectured that the original habitat of suctobelbid mites was in the Northern Hemisphere (probably, North America or Europe) and the mites gradually expanded their distributional area to the Southern Hemisphere.

**Key words:** classification, Japan, soil mites, Suctobelbidae (Oribatida), systematical survey.

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## Introduction

The majorities of oribatid mites inhabit the soil surface and feed on plant litter. They represent a group of soil arthropods rich both in the number of species and in density. Thus, they play an important role in the decomposition of organic matter in the soil (AOKI, 1973). Recently, they have also been considered to be an efficient biological indicator of soil environment (AOKI, 1995). Among the oribatid mites the members of the family Suctobelbidae (Acari, Oribatida) are characterized by their small bodies and a large number of species, similar to the closely related family Oppiidae.

In the present paper the objectives were as follows: 1) to record thoroughly and arrange all of the species of the family Suctobelbidae of Japan, and 2) to attempt a systematic survey of the genera of this family worldwide in relation to their distribution.

Chapter I presents a general morphology of the family Suctobelbidae, providing figures of a model specimen and the terminology used. Chapter II gives a historical review of systematic studies of the family Suctobelbidae, including reports of species from around the world and notes on the global genera. Chapter III explains morphology using a drawing and the terminology used. Chapter IV presents a list and descriptions of the species found from Japan, including 59 species and three subspecies belonging to 10 genera. Chapter V is focused on the relationship between the genera to illustrating evolutionary trends in relation to their distribution in the world.

## I General Morphology of the Family Suctobelbidae (Fig.1)

**Prodorsum:** Prodorsum firmly fused to hysterosoma. Mandible acicular, with elongated toothless chelicerae. Rostrum usually provided with teeth or incisions. As teeth are not always clearly discernible in the

dorsal and ventral aspects, it is needed to observe the frontal or oblique aspect as well. Rostral setae usually bent knee-like at about half length and ciliated on the basal half. One pair of tectopedial fields present, but often absent or reduced. [By using scanning electron microscope, KOSAKU (1980) discovered that tectopedial field on each side was not concave but was in fact elevated like a plateau]. Lamellae fused to a small lamellar knob, bearing lamellar setae (*le*). Sensillus situated in a cup-shaped cavity, the bothridium. Head of sensillus generally scopate, fusiform or clavate in shape. Two pairs of condyles present posterior to interbothridial ridges and bothridia, opposing to condyles on anterior margin of notogaster. Dorsosejugal suture rather distinct.

**Notogaster:** Anterior margin of notogaster smooth or beset with one or two condyles. Number of notogastral setae of nine pairs, 10 pairs, 11 pairs or 12 pairs (8 pairs *in* only one species from Japan). One pair of lyrifissures and often one pair of openings connected with latero-abdominal glands.

**Ventral aspect:** Anal and genital apertures widely separated from each other. Number of genital setae of four to seven pairs. Apodemata well developed: Ventro-sejugal apodema often with a cavity at its inside end. Setal formula of epimerata 3-1-3-3. Two pairs of anal setae, three pairs of adanal setae and one pair of agential setae present. In most cases, adanal lyrifissures situated close to anal plates. Frontal border of discidium often provided with a sharp cusp.

## II History of the Systematic Study on the Family Suctobelbidae

### Reports of Species

Up to date, many species of the family Suctobelbidae have been reported; mainly from Europe by STRENZKE (1951), BALOGH & MAHUNKA (1967, 1968, 1969a, 1969b, 1974, 1980, 1981), BALOGH (1968, 1970a, 1970b, 1970c,

1983), MORITZ (1964, 1966, 1970, 1971), MAHUNKA (1974, 1978, 1979, 1983a, 1983b, 1983c, 1983d, 1984, 1985), WILLMANN (1953), PÉREZ-ÍÑIGO (1976), GORDEEVA (1991) and from America by WOOLLEY & HIGGINS (1976). They have also been reported from the Andes Mountains, New Zealand, Northwest Pakistan, Central Sahara and Java by HAMMER (1961, 1966, 1975, 1977, 1979). Owing to their small body size, studies of these mites have been rather neglected in Japan, though some species were previously reported by AOKI (1961, 1970, 1984, 1987), AOKI & FUKUYAMA (1976), FUJIKAWA (1972, 1986), FUJITA & FUJIKAWA (1987) and ENAMI & CHINONE (1997).

### Notes on the Genera of the World

Though GRANDJEAN (1954) had been long regarded as the author of the family Suctobelbidae, its authority was changed to JACOT (1938) by MARSHALL et al (1987). In 1972, BALOGH assigned the following 12 genera to the family Suctobelbidae.

- 1 *Suctobelba* PAOLI, 1908
- 2 *Suctobelbella* JACOT, 1937
- 3 *Suctobelbila* JACOT, 1937
- 4 *Rhynchobelba* WILLMANN, 1953
- 5 *Zeasuctobelba* HAMMER, 1966
- 6 *Rynchoppia* BALOGH, 1968
- 7 *Rhinosuctobelba* WOOLLEY, 1969
- 8 *Neosuctobelba* BALOGH et MAHUNKA, 1969
- 9 *Fenestrobella* BALOGH, 1970
- 10 *Allosuctobelba* MORITZ, 1970
- 11 *Sucteremaeus* GOLOSOVA et KRIVOLUTSKY, 1970
- 12 *Ussuribata* GOLOSOVA et KRIVOLUTSKY, 1970

Later, two genera transferred into other families: *Fenestrobella* into the Rhynchoribatidae in 1974 by BALOGH and *Rhynchoppia* into the Oppiidae in 1983 by BALOGH & MAHUNKA. There were some confusion in the classification of the genera, particularly between *Suctobelba* and *Suctobelbella*. Many species previously placed in the genus *Suctobelba* should have been included in the genus *Suctobelbella*.

After 1975, the following five genera were established.

- 13 *Parisuctobelba* HIGGINS et WOOLLEY, 1976
- 14 *Parasuctobelba* HAMMER, 1977
- 15 *Novosuctobelba* HAMMER, 1977
- 16 *Discosuctobelba* HAMMER, 1979
- 17 *Flagrosuctobelba* HAMMER, 1979

Further in 1984 and 1988, MAHUNKA created the following two genera.

- 18 *Serratobelba* MAHUNKA, 1984
- 19 *Suctobelbiloides* MAHUNKA, 1988

Later, GORDEEVA created another genus in 1991.

- 20 *Suctobelbata* GORDEEVA, 1991

It is considered that the genus *Fenestrobella* should remain in the Suctobelbidae for reasons of several important features on the prodorsum, such as the rostral setae and chelicerae. Among the genera mentioned above, *Discosuctobelba* and *Flagrosuctobelba* should be dealt with as junior synonyms of the genus *Suctobelbella*. These two genera are characterized only by the shape of sensillus. Since AOKI reported in 1971 that the sensillus of arboreal oribatids are similar to one another in shape regardless of systematic position, the shape of sensillus alone cannot be considered a useful character for separation of genera.

In 1992, J. BALOGH & P. BALOGH arranged 19 genera to the family Suctobelbidae. In their work, *Rhynchoppia* and *Fenestrobella* were restored to the family Suctobelbidae. The restoration of these two genera to Suctobelbidae by BALOGH & BALOGH (1992) is supported here.

After extensive examination of many species of suctobelboid mites from Japan, the following characters are new recognized to be important in the classification of the genera: 1) the number of notogastral setae, 2) the number of genital setae, 3) the shape of anterior margin of notogaster, 4) the shape of tectopedial fields, 5) the shape of rostral setae, and 6) the shape of lamellar knob. Based on these characters, 18 of the genera mentioned above for the family Suctobelbidae are recognized here, excepting the two genera of *Discosuctobelba* and *Flagrosuctobelba*.

In Japan, the next 10 genera can be recognized, including 4 new genera.

- 1 *Allosuctobelba* MORITZ, 1970
- 2 *Suctobelba* PAOLI, 1908
- 3 *Suctobelbata* GORDEEVA, 1991
- 4 *Kathetosuctobelba* gen.n.
- 5 *Suctobelbila* JACOT, 1937
- 6 *Novosuctobelba* HAMMER, 1977
- 7 *Kuklosuctobelba* gen.n.
- 8 *Niosuctobelba* gen.n.
- 9 *Leptosuctobelba* gen.n.
- 10 *Suctobelbella* JACOT, 1937

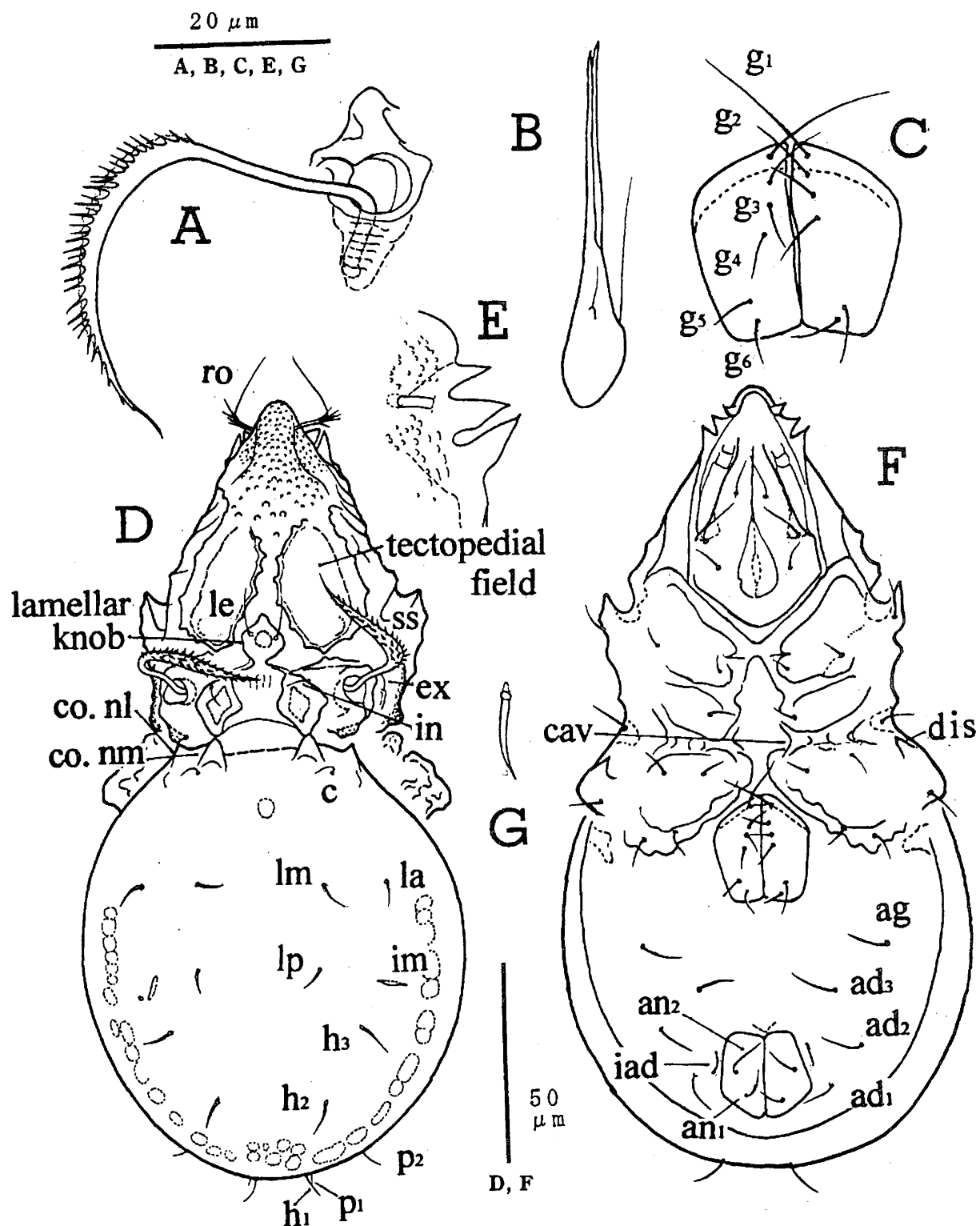


Fig.1:

Schematic diagram of suctobelbid mite [(*Suctobelbella naginata* (AOKI, 1961))] ---A: Sensillus. B: Chelicera. C: Genital plate, g<sub>1</sub>-g<sub>6</sub>; genital setae. D: Dorsal aspect, ro; rostral seta, le; lamellar seta, in; interlamellar seta, ss; sensillus, co.nl; lateral notogastral condyles, co.nm; median notogastral condyles, c, lm, la, lp, h<sub>1</sub>, h<sub>2</sub>, h<sub>3</sub>, p<sub>1</sub>, p<sub>2</sub>; notations of notogastral setae, im; lyrifiature. E: Rostral teeth in lateral aspect. F: Ventral aspect, cav; a cavity situated median end of apo.sj, ag; aggenital seta, ad<sub>1</sub>-ad<sub>3</sub>; adanal setae, iad; lyrifiature, cus; cusp of discidium, G: Notogastral seta (lm).



### III Drawing and Terminology

#### Drawing

All figures presented here were made with a drawing apparatus. For each description of species, dorsal and ventral views of body and an enlarged view of sensillus and rostral regions are provided, as shown in Fig.1. As the rostral teeth are usually directed downwards, the teeth were configured in lateral view or on crushed specimens.

#### Terminology

In order to describe the suctobelbid mites in detail, abbreviation and terms are arranged here alphabetically and briefly explained.

Some of them are newly proposed.

*ag*: aggenital seta

*ad*<sub>1</sub>, *ad*<sub>2</sub>, *ad*<sub>3</sub>, *ad*<sub>4</sub>, *ad*<sub>5</sub>: adanal setae 1-5

*an*<sub>1</sub>, *an*<sub>2</sub>: anal setae 1-2

*apo.sj*: ventro-sejugal apodema

*cav* (new term): a cavity situated median end of *apo.sj*

*co.pl*: lateral prodorsal condyle

*co.pm*: median prodorsal condyle

*co.nl*: lateral notogastral condyle

*co.nm*: median notogastral condyle

*cus* (new term): cusp of discidium

*c*, *la*, *lm*, *lp*, *h*<sub>1</sub>, *h*<sub>2</sub>, *h*<sub>3</sub>, *p*<sub>1</sub>, *p*<sub>2</sub>: notation of dorsal setae

*g*<sub>1</sub>, *g*<sub>2</sub>, *g*<sub>3</sub>, *g*<sub>4</sub>, *g*<sub>5</sub>, *g*<sub>6</sub>: notation of genital setae 1-6

*gla*: lateroabdominal gland

*im*: median lyrifissure

*in*: interlamellar seta

*iad*: adanal lyrifissure

*le*: lamellar seta

*ro*: rostral seta

*RLN*: relative length to notogaster

$$RLN = \text{Length of any structure} / \text{Length of notogaster} \times 100$$

(%)

*ss*: sensillus

### IV List and Descriptions of the Species Found from Japan

The present paper is the first monograph of the Family Suctobelbidae of Japan, including 59 species and 3 subspecies belonging to 10 genera. Among the species treated here, 4 genera and 41 species and 1 subspecies are new to science and 6 other species are newly recorded from Japan. The type series is deposited in the collection of National Science Museum, Tokyo, and the remaining specimens examined are in the Ibaraki Nature Museum.

#### List of the Species

Genus *Allosuctobelba* MORITZ, 1970

*A. simplex* FUJIKAWA, 1972

*A. grandis* (PAOLI, 1972)

*A. japonica* sp.n.

*A. bicuspidata* AOKI, 1984

*A. tricuspidata tricuspidata* AOKI, 1984

*A. tricuspidata tokara* AOKI, 1984

*A. tricuspidata satsumaensis* subsp.n

Genus *Suctobelba* PAOLI, 1908

*S. serrata* sp.n.

*S. simplex* sp.n.

Genus *Suctobelbata* GORDEEVA, 1991

*S. punctata* HAMMER, 1955

*S. hirauchiae* sp.n.

Genus *Kathetosuctobelba* gen.n.

*K. makarcevi* (KRIV. et GOLOSOVA, 1974) comb.n.

Genus *Suctobelbilla* JACOT, 1937

*S. densipunctata* sp.n.

*S. penniseta* sp.n.

*S. kiyosumiensis* sp.n.

*S. tuberculata* AOKI, 1970

Genus *Novosuctobelba* HAMMER, 1977

*N. monodentis* sp.n.

*N. latirostrata* sp.n.

Genus *Kuklosuctobelba* gen.n.

*K. perbella* sp.n.

*K. yamizoensis* sp.n.

*K. tenuis* sp.n.

Genus *Niosuctobelba* gen.n.

*N. ruga* sp.n.

Genus *Leptosuctobelba* gen.n.

*L. vulgaris* sp.n.

*L. lauta* sp.n.

*L. monofenestella* sp.n.

Genus *Suctobelbella* JACOT, 1937

## type A (6 pairs of genital setae)

- S. naginata* (AOKI, 1961)  
*S. kantoensis* sp.n.  
*S. lata* sp.n.  
*S. acuta* sp.n.  
*S. solita* sp.n.  
*S. latipectoralis* sp.n.  
*S. hokkaidoensis* sp.n.  
*S. magnicava* sp.n.  
*S. tohokuensis* ENAMI & CHINONE, 1997  
*S. parva* sp.n.  
*S. aokii* sp.n.  
*S. subcornigera* (FORSSLUND, 1941) comb. n.  
*S. granifera* sp.n.  
*S. nayoroensis* FUJITA et FUJIKAWA, 1987  
*S. flagellifera* sp.n.  
*S. ancorhina* sp.n.  
*S. crispirhina* sp.n.  
*S. alpina* sp.n.  
*S. yezoensis* FUJITA et FUJIKAWA, 1984  
*S. spirochaeta* MAHUNKA, 1983  
*S. variosetosa* (HAMMER, 1961) comb. n.  
*S. reticulata* sp.n.  
*S. longidentata* sp.n.

## type B (5 pairs of genital setae)

- S. plumosa* sp.n.  
*S. ibarakiensis* sp.n.  
*S. frondosa* AOKI et FUKUYAMA, 1976  
*S. hastata* PANKOW, 1986  
*S. claviseta nipponica* FUJIKAWA, 1986  
*S. pumila* sp.n.  
*S. verrucosa* sp.n.  
*S. reticulatoides* sp.n.  
*S. tamurai* sp.n.  
*S. tumida* sp.n.

## type C (4 pairs of genital setae)

- S. longisensillata* FUJITA et FUJIKAWA, 1987  
*S. singularis* (STRENZKE, 1950)  
*S. nitida* sp.n.  
*S. rotunda* sp.n.

2(3) Body size large (more than 400 $\mu$ m); anterior margin of notogaster smooth ----- *Allosuctobelba* MORITZ, 1970

3(2) Body size medium to small (less than 400 $\mu$ m); anterior margin of notogaster with low swellings ----- 4

4(5) Outer edge of tectopedial field present ; rostral setae bent like a knee ----- *Suctobelba* PAOLI, 1908

5(4) Outer edge of tectopedial field reduced ; rostral setae bent like a knee ----- *Kathetosuctobelba* gen. n.

6(1) Anterior margin of notogaster with clear condyles ----- 7

7(12) One pair of condyles ----- 8

8(9) Only one pair of condyles ----- *Novosuctobelba* HAMMER, 1970

9(8) One pair of condyles and one unpaired low swelling or projection medially ----- 10

10(11) One unpaired low swelling; notogastral surface with no some pairs of excrescences or depressions ----- *Suctobelbata* GORDEEVA, 1991

11(10) One unpaired projection; notogastral surface with the some pairs of excrescences or depressions ----- *Suctobelbilla* JACOT, 1937

12(7) Two pairs of condyles ----- 13

13(14) *Co.nm* and *co.nl* closely situated and connected basally, so they appear to be one biapical condyle. Body elongate ----- *Leptosuctobelba* gen.n.

14(13) *Co.nm* and *co.nl* not so closely situated ----- 15

15(16) Condyles of notogaster medium size, rather compact; 9 pairs of notogastral setae ----- *Suctobelbella* JACOT, 1937

16(15) Condyles of notogaster well developed, especially, *co.nl* much longer and stronger than *co.nm* ----- 17

17(18) Ten pairs of notogastral setae; tectopedial field small and compact ----- *Kuklosuctobelba* gen.n.

18(17) Nine pairs of notogastral setae; tectopedial field like a drop-shaped; condyles of notogaster very long and keel-like, many stripes on dorsal and ventral surfaces ----- *Niosuctobelba* gen.n.

# Key to the Japanese Genera of the Family Suctobelbidae

- 1(6) Anterior margin of notogaster smooth or with some low swellings, without clear condyles ----- 2

Genus *Allosuctobelba* MORITZ

[Japanese name: Ohmadodani-zoku]

*Allosuctobelba* MORITZ, 1970c

Type species: *Suctobelba grandis* PAOLI, 1908

**Diagnosis:** Body large. No condyles on the anterior

margin of notogaster. Rostral setae bent like a knee. Tectopedial field undeveloped, small or observed only by its outer border. Lamellar knob absent or replaced by two large lobe-shaped tubercles. Rostral teeth present or absent. Middle part of prodorsum with many large tubercles. Ten or eleven pairs of notogastral setae. Four or six pairs of genital setae present.

**Distribution:** Austria, China (Hong-Kong), France, Germany, Hungary, Italy, Russia (Leningrad), Sweden, Switzerland, USA (Alaska, Connecticut, Missouri, North Carolina, Illinois) and Japan.

#### Key to the Japanese Species of the Genus *Allosuctobelba*

- 1(2) Eleven pairs of notogastral setae -----  
----- *A. simplex* FUJIKAWA, 1972
- 2(1) Ten pairs of notogastral setae ----- 3
- 3(4) Four pairs of genital setae ----- *A. grandis* (PAOLI, 1908)
- 4(3) Six pairs of genital setae ----- 5
- 5(6) Rostrum without a tooth or projection -----  
----- *A. japonica* sp.n.
- 6(5) Rostrum with projections ----- 7
- 7(8) Rostrum with 2 projections -----  
----- *A. bicuspidata* AOKI, 1984
- 8(7) Rostrum with 3 projections ----- 9
- 9(10) Small body size, body length: 360-380 $\mu$ m -----  
----- *A. tricuspidata satsumaensis* subsp.n.
- 10(9) Large body size, body length more than about 500 $\mu$ m ----- 11
- 11(12) Notogastral setae winding -----  
----- *A. tricuspidata tricuspidata* AOKI, 1984
- 12(11) Notogastral setae not winding -----  
----- *A. tricuspidata tokara* AOKI, 1987

#### *Allosuctobelba simplex* FUJIKAWA, 1972

[Ezo-ohmadodani]

(Fig.2)

*Allosuctobelba simplex* FUJIKAWA, 1972, p.159, Fig.47.

**Diagnosis:** Eleven pairs of notogastral setae. Rostrum without rostral teeth. Rostral setae fine and smooth. Sensillus incurved and barbed. Tectopedial field seems to be underdeveloped. Genital setae 6 pairs. Body length: 640 $\mu$ m, width: 310 $\mu$ m.

**Distribution:** Japan.

#### *Allosuctobelba grandis* (PAOLI, 1908)

[Ohmadodani]

(Fig.3)

*Suctobelba grandis*: AOKI, 1970, p.422, figs. 56-66.

*Allosuctobelba grandis*: MORITZ, 1970c, p.422.

**Diagnosis:** Ten pairs of notogastral setae. Rostrum with about 3 teeth on each side. Rostral setae barbed and incurved strongly, but not bent like a knee. Sensillar head fusiform with a long thin tip and barbed outside. Genital setae 4 pairs. Body length: 450-535 $\mu$ m.

**Distribution:** Austria, France, Italy, Sweden, and Japan.

#### *Allosuctobelba japonica* sp.n.

[Yamato-ohmadodani]

(Fig.4)

**Material examined:** Holotype (NSMT-Ac 11303), Mt. Yamizo, Ibaraki-ken, 23-VIII-1980, S. CHINONE. From litter under the forest of *Fagus crenata* and *Quercus mongolica* var. *grosseserrata*. --- 2 paratypes (NSMT-Ac 11304 and 11305): the same data as the holotype.--- 2 paratypes (NSMT-Ac 11306 and 11307): Mt. Yamizo, the same point as the former, 28-IX-1981, S. CHINONE.--- 1 ex. Mt. Hanakame, Ibaraki-ken, 23-VIII-1984, S. CHINONE. From litter under the forest of *Fagus crenata* and *Abies firma*.

**Measurements:** (in  $\mu$ m, n=5): Body length 385-440 (av.406), width 220-250 (av. 229). Length of setae (av.): *le* 33, *c* 63, *lm* 68, *lp* 77, *h*<sub>1</sub> 33.

**Prodorsum:** Rostrum protruding, its margin rather roundish triangular, without teeth or incisions. Rostral setae bow-shaped, with lateral cilia in the middle portion, not bent like a knee. Sensillus long, at distal end fusiform with a short pointed tip. Tectopedial fields narrow and separated widely from each other. Lamellar knob divided into 2 robust tubercles, each bearing a lamellar seta. Median surface of prodorsum with many large tubercles.

**Notogaster:** Anterior margin of notogaster smoothly arched, without condyles. Ten pairs of notogastral setae. The setae long, smooth, rather strong, sharply pointed at tip and gently curved. Seta *lm* located at a level a little posterior to *la*. Relative length of setal intervals :  $h_1-h_1 \div p_1-p_1$ . RLN of notogastral setae : *lm* 25, *lp* 29. Lyrifissure *im* aligned transversely, near to *gla*, at a level between

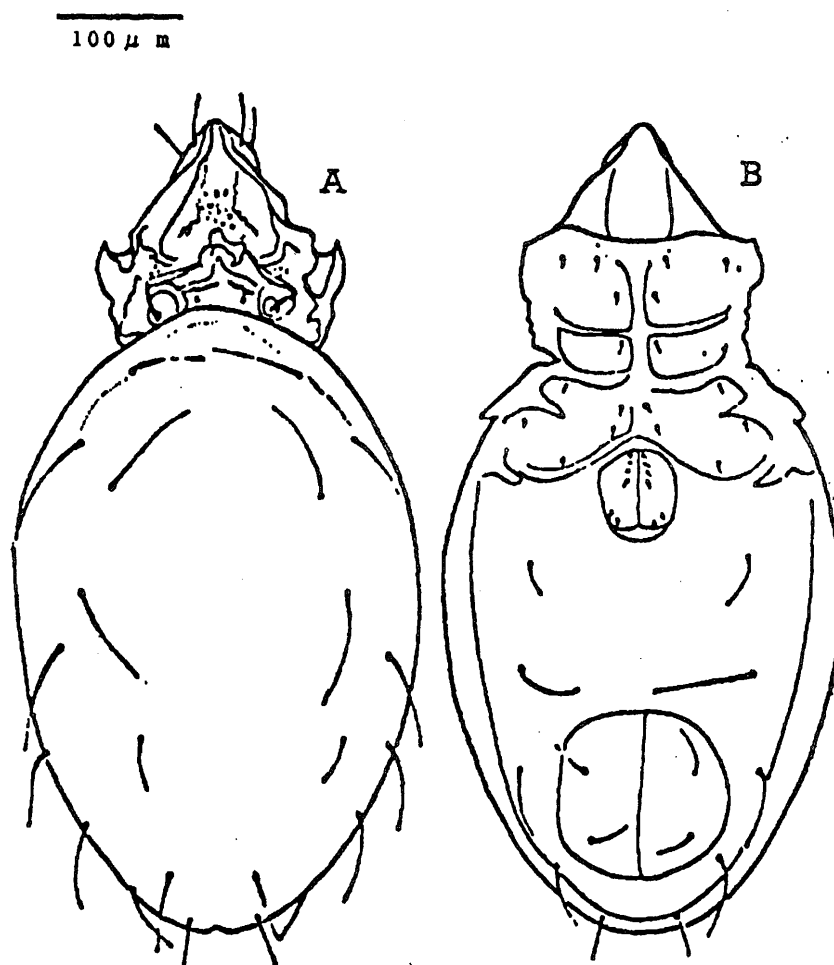


Fig.2: *Allosuctobelba simplex* FUJIKAWA, 1972. --- A: Dorsal aspect, B: Ventral aspect. (after FUJIKAWA, 1972)

seta *lp* and seta *h*<sub>3</sub>.

**Ventral aspect:** Genital plate with 6 setae: each seta rather long and about equal in length. Anal plate large, about 1.8× as long as the genital plate. Adanal setae longer than the remaining genito-anal setae. Aggenital setae about equal in length to anal setae. Relative length of setal intervals:  $ag-ag \geq ad_3-ad_3$ . One pair of *iad* situated near anal plate, at a level of *ad*<sub>2</sub>.

**Remarks:** Up to now, 4 species and 1 subspecies belonging to this genus have been reported from Japan: *Allosuctobelba grandis* (PAOLI, 1908), *A. simplex* FUJIKAWA, 1972, *A. bicuspidata* AOKI, 1984, *A. tricuspidata* AOKI, 1984 and *A. tricuspidata tokara* AOKI, 1987. The new species differs from them in the combination of the following points (Table 1): (1) the number of notogastral setae, (2) the number of teeth or

projection of rostrum, (3) the shape of setae *ro*, (4) the shape of sensilli, and (5) the number of genital setae.

***Allosuctobelba bicuspidata* AOKI, 1984**

[Hutaba-ohmadodani]

(Fig.5)

*Allosuctobelba bicuspidata* AOKI, 1984, p.422, fig.12.

**Diagnosis:** Ten pairs of notogastral setae. Rostrum with a pair of projections and without lateral teeth. Rostral setae almost smooth and incurved gently. Lamellar knob divided into two parts, each with seta *le*. Sensillus bearing a fusiform head with a short pointed tip and minute barbation. Six pairs of genital setae. Body length: 424-470μm, width: 260-290μm.

**Distribution:** Japan.

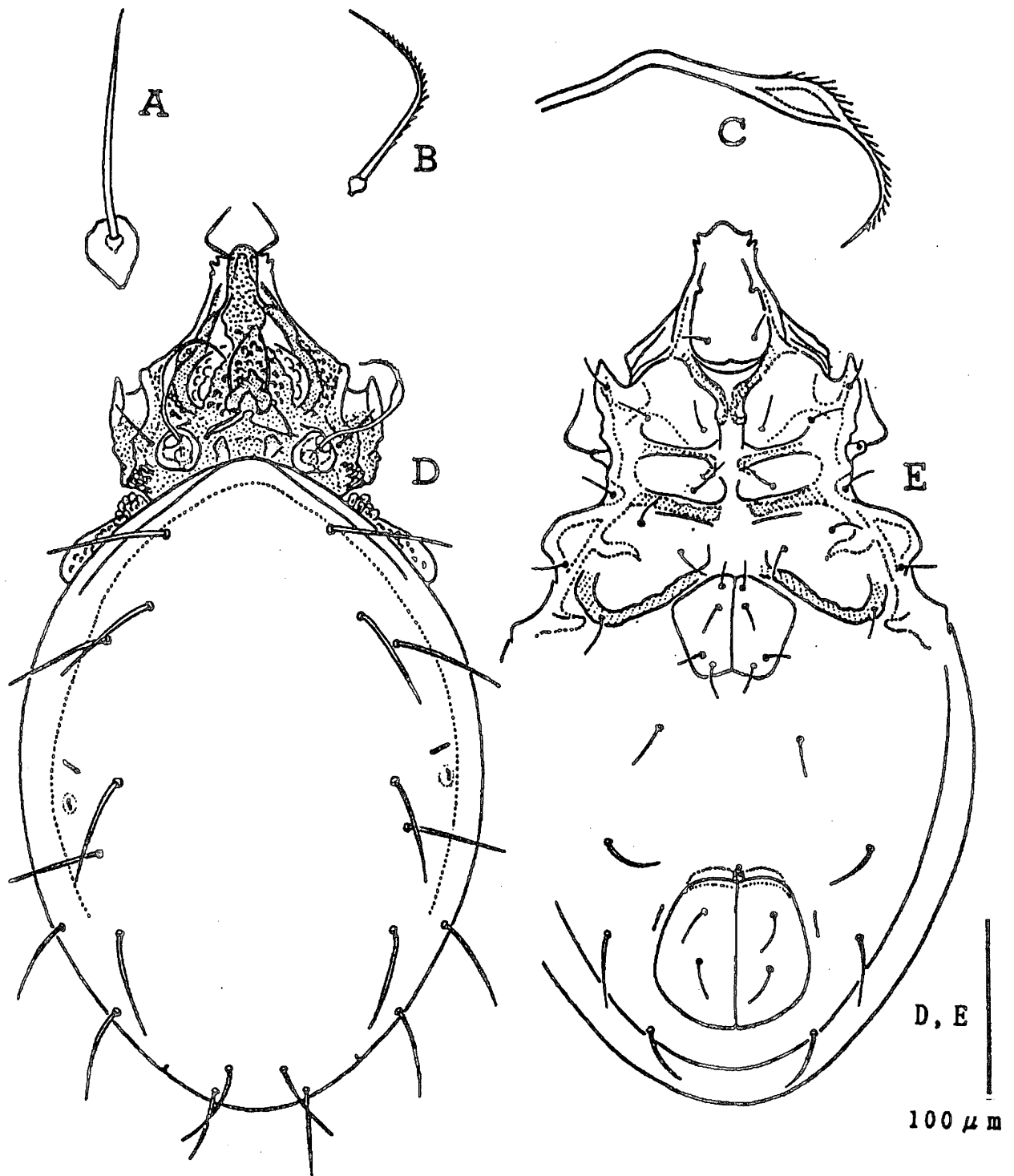


Fig.3: *Allosuctobelba grandis* (PAOLI, 1908) ---A: Lamellar seta, B: Rostral seta, C: Sensillus, D: Dorsal aspect, E: Ventral aspect. (after AOKI, 1970)

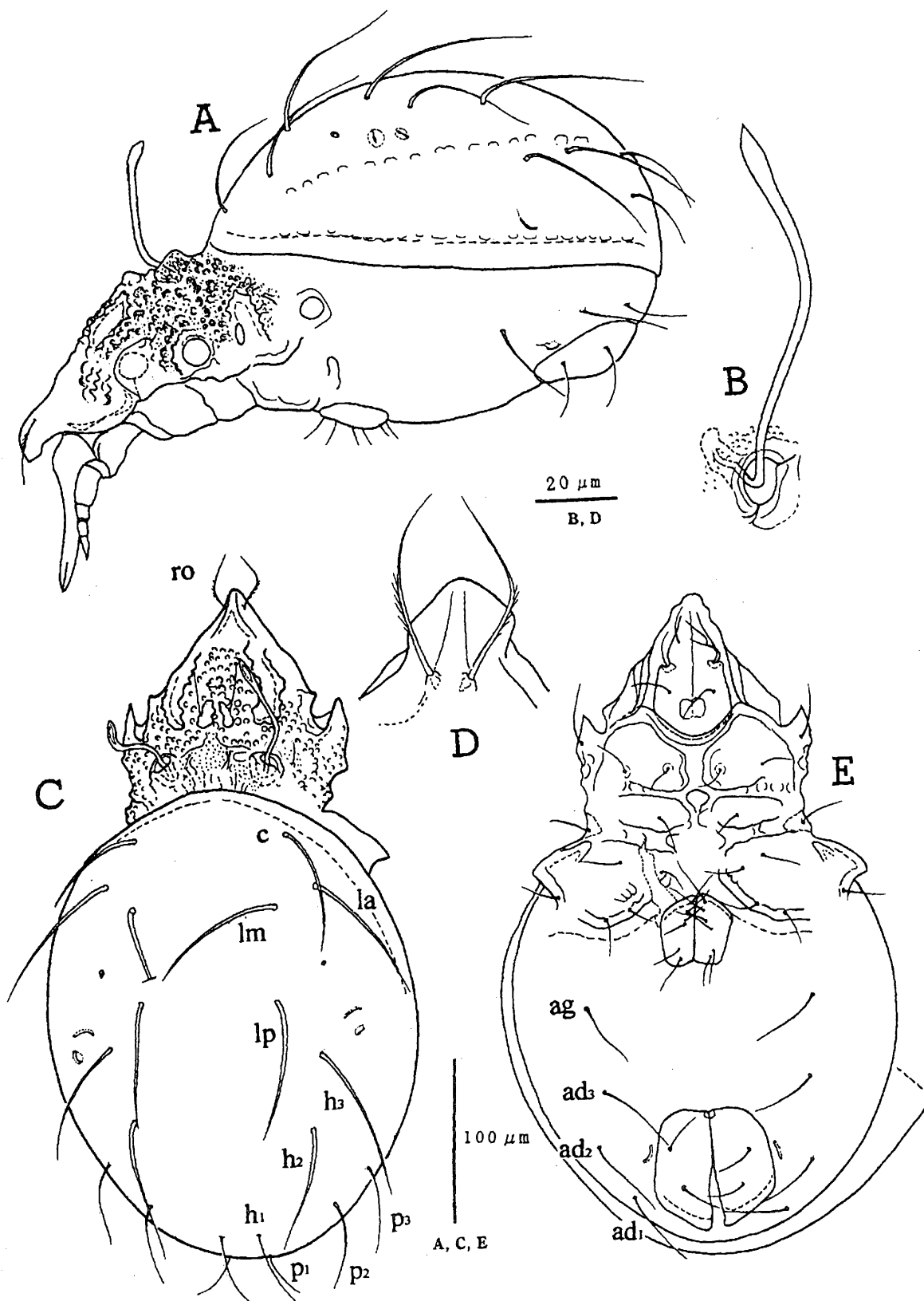


Fig.4 *Allosuctobelba japonica* sp. n.--- A: Lateral aspect. B: Sensillus. C: Dorsal aspect. D: Rostrum in dorsal view. E: Ventral aspect

Table 1. Characteristics of the six closely related species of the genus *Allosuctobelba*

Species	Characteristics	(1)	(2)	(3)	(4)	(5)
<i>A. grandis</i>		10	2-3 t.	barbed	C	4
<i>A. simplex</i>		11	0	smooth	A	6
<i>A. bicuspidata</i>		10	2 proj.	smooth	B	6
<i>A. tricuspidata</i>		10	3 proj.	barbed	C	6
<i>A. tricuspidata tokara</i>		10	3 proj.	barbed	C	6
<i>A. japonica</i> n. sp.		10	0	barbed	B	6

(1) The number of pairs of notogastral setae.

(2) The number of pairs of teeth (t.) or projection (proj.) on rostrum.

(3) The shape of setae *ro*.

(4) the shape of sensilli

Type A : a slender head, occasionally beset with minute bristles

Type B : head fusiform, with a short tip

Type C : head fusiform, with a long thin tip

(5) The number of genital setae.

***Allosuctobelba tricuspidata tricuspidata* AOKI, 1984**

[Mitsuba-ohmadodani]

(Fig.6)

*Allosuctobelba tricuspidata* AOKI, 1984, p.140, fig. 13.

New locality from Japan: One ex. Mt. Kiyosumi, Chiba-ken, 18-VIII-1983. From litter under the forest of *Abies firma*. S. CHINONE.

**Diagnosis:** Ten pairs of notogastral setae, long and winding. Rostrum pointed at tip, with a projection on each side, no lateral teeth. Seta *ro* strongly curved inward and distinctly barbed on the outside. Sensillus bearing a fusiform head with a long tip minutely barbed. Six pairs of genital setae. Body length: 545 $\mu$ m, width: 330 $\mu$ m.

**Distribution:** Japan.***Allosuctobelba tricuspidata tokara* AOKI, 1987**

[Tokara-ohmadodani]

(Fig.7)

*Allosuctobelba tricuspidata tokara* AOKI, 1987, p.26, fig. 12.

**Diagnosis:** Ten pairs of notogastral setae, not winding. Rostrum sharply pointed at tip, with a projection on each side, no lateral teeth. Rostral setae incurved strongly, barbed at basal half. Sensillus bearing a fusiform head with a long tip minutely barbed. Six pairs of genital setae.

Body length: 413 $\mu$ m, width: 227 $\mu$ m.**Distribution:** Japan.***Allosuctobelba tricuspidata satsumaensis* subsp. n.**

[Satsuma-ohmadodani]

(Fig.8)

**Material examined:** Holotype (NSMT-Ac 11308), Kurakake, Uenohara, Kokubu-shi, Kagoshima-ken. 30-III-1990, K. ISHII & H. SAKAYORI. From litter under grove of ever green broad leaved trees. ---3 paratypes (NSMT-Ac 11309 to 11311): the same data as the holotype.

**Measurements:** (in  $\mu$ m, n=4): Body length 360-380 (av.375), width 210-225 (av.216), L/W 1.7. Length of setae (av.): *le* 37, *c* 46, *lm* 57, *lp* 62.

**Prodorsum:** Rostrum pointed at tip, with a projection on each side and no other teeth. Seta *ro* curved inwards, barbed on basal half. Smooth dorsal surface of rostral area edged with one pair of arched ridges posteriorly. Tectopedial fields small and widely separated from each other. Lamellar knob divided into 2 robust tubercles, each with a long seta *la*. Seta *la* about 2.5 $\times$  as long as seta *in*. Sensillar head fusiform, with a long ciliated tip; a tip about 1.5 $\times$  as long as head. Median surface of prodorsum with many large tubercles.

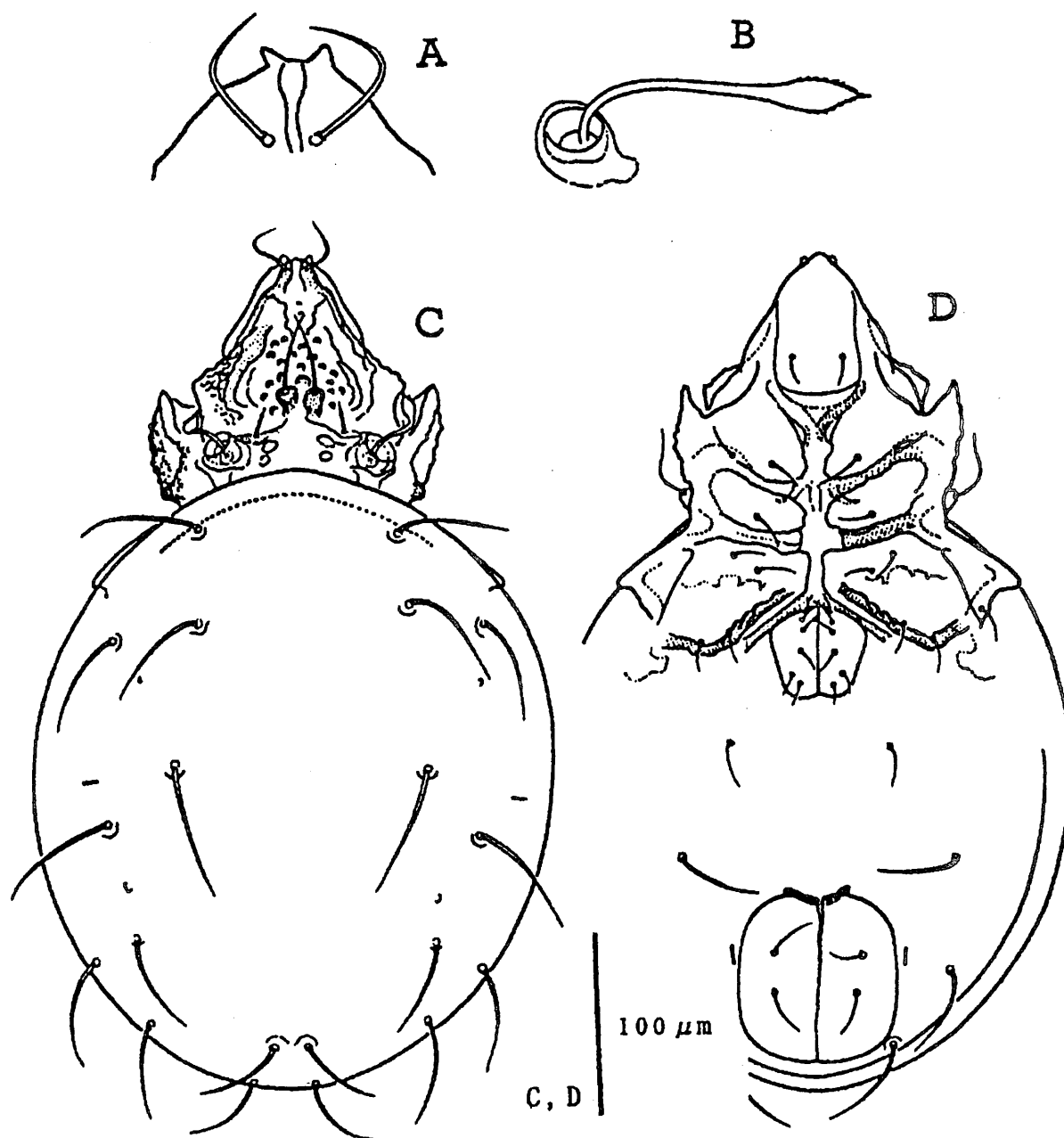


Fig.5: *Allosuctobelba bicuspidata* AOKI, 1984. --- A: Rostrum and rostral setae, B: Sensillus, C: Dorsal aspect, D: Ventral aspect. (after AOKI, 1984)



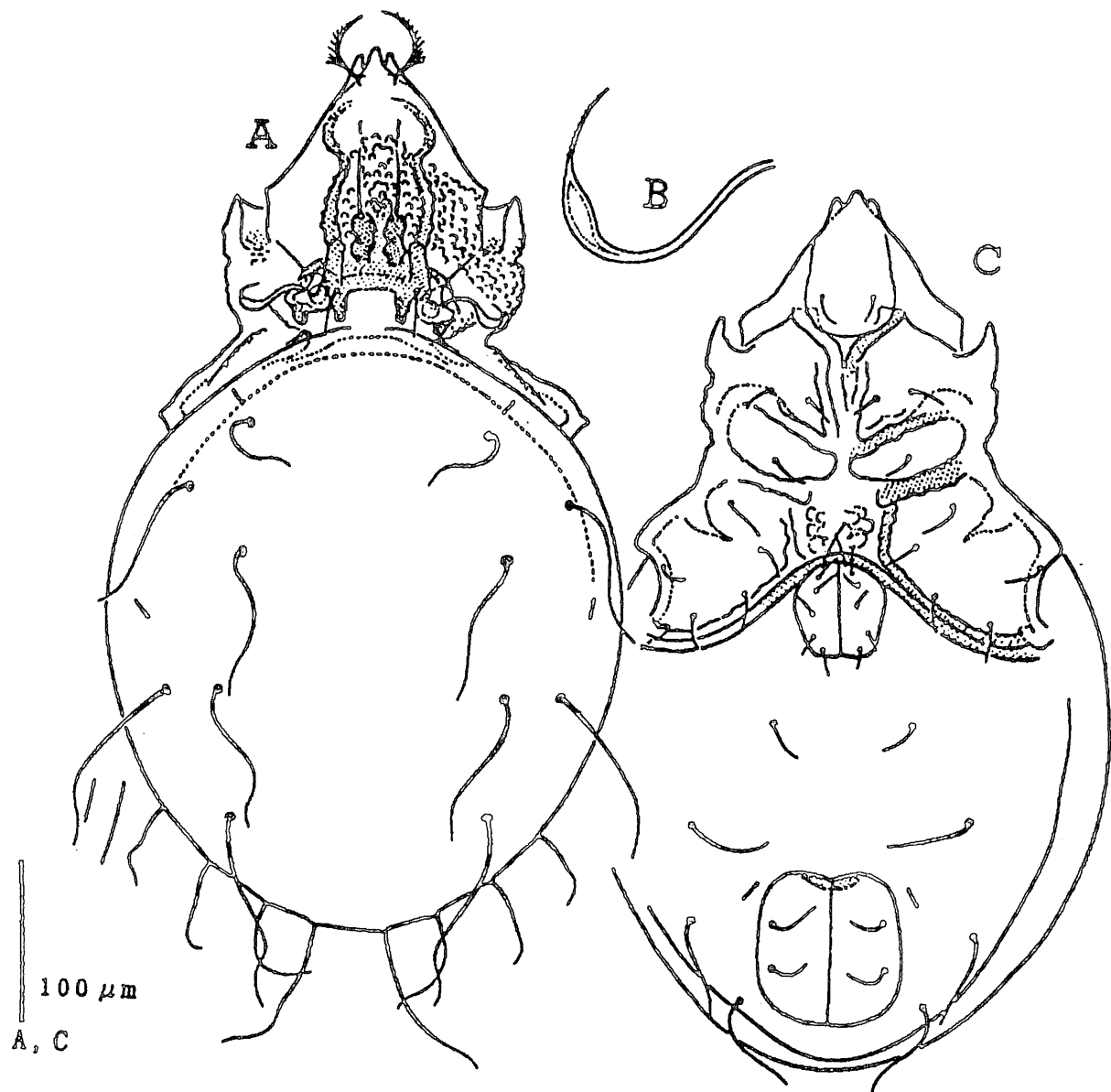


Fig.6: *Allosuctobelba tricuspidata tricuspidata* AOKI, 1984. --- A: Dorsal aspect, B: Sensillus, C: Ventral aspect. (after AOKI, 1984)

**Notogaster:** Anterior margin of notogaster smoothly arched, without condyle. Ten pairs of notogastral setae. The setae long, smooth, sharply pointed at tip, gently curved at basal portion. Seta *lm* located at a level posterior to *la*, and seta *lp* at a level anterior to seta *h*<sub>3</sub>. Relative length of setal intervals:  $h_1-h_1 < p_1-p_1$ . *RLN* of notogastral setae: *lm* 21, *lp* 23.

**Ventral aspect:** Epimeral setae *1a*, *1b*, *2a*, *3a* and *3b* each inserted on a small oval tubercle. Epimera III-IV

widely separated by 1 pair of longitudinal ridges on both side of sternal ridge. Genital plate with 6 pairs of setae; *g*<sub>1</sub> and *g*<sub>2</sub> rather longer than the remaining setae. Anal plate large, about 1.5× as long as genital plate. Anal setae *an*<sub>1</sub> and *an*<sub>2</sub> inserted rather close to lateral margin of anal plate. Adanal setae distinctly longer than the remaining genito-anal setae. A distinct transverse ridge, projecting posteriad in trapezoid or roundish shape found just behind anal opening.

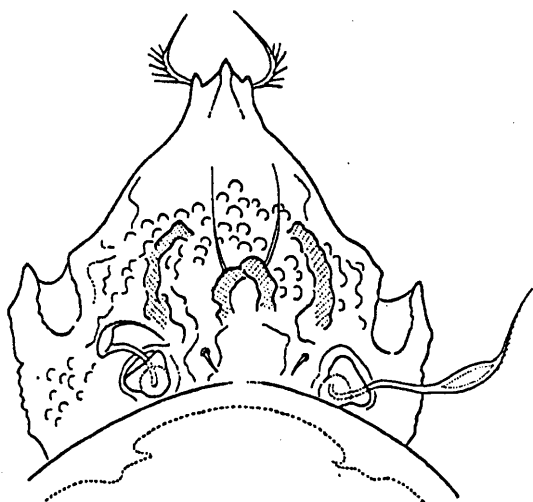


Fig. 7: *Allosuctobelba tricuspidata tokara* AOKI, 1987. ---  
Prodorsum and anterior part of notogaster. (after AOKI, 1987)

**Remarks:** The new subspecies differs from *Allosuctobelba tricuspidata tricuspidata* AOKI, 1984 and *A. t. tokara* AOKI, 1987, in (1) the longer tip of sensillar head, (2) the shape of transverse ridge behind anal opening, and (3) the smaller body size.

#### Genus *Suctobelba* PAOLI

[Madodani- zoku]

*Suctobelba* PAOLI, 1908

Type species: *Notaspis trigona* MICHAEL, 1888

**Diagnosis:** Ten pairs of notogastral setae. Condyles on the anterior margin of notogaster absent, showing only low swellings. Rostral setae bent like a knee, and incurved or rather directed anterolaterad. The tectopedial fields not always well defined and their surface often granulated. Sensillus usually with a clavate head. The surface of prodorsum densely granulated. Six pairs of genital setae.

**Distribution:** The Alps, Argentina, Austria, Czech, Germany, Holland, Italy, Russia (Caucasia), Sweden, Uklaina, USA (Colorado, Alaska), and Japan.

#### Key to the Japanese Species of the Genus *Suctobelba*

- 1(2) Rostrum long and slender, its lateral margin slightly concave; rostral setae curved inwards

- *S. serrata* sp.n.  
2(1) Rostrum not so long and slender; rostral setae directed laterad ----- *S. simplex* sp.n.

#### *Suctobelba serrata* sp. n.

[Nokogiri-madodani]

(Fig. 9)

**Material examined:** Holotype (NSMT-Ac 11312), Ohnuma Park, Shiobara-machi, Tochigi-ken, 13-XI-1994, collected by the members of Meeting of Tochigi Soil Zoology. From the litter under grove of *Aesculus turbinata*, *Quercus mongolica grosseserrata* and *Fagus crenata*. -- 2 paratypes (NSMT-Ac 11313 and 11314): the same data as the holotype.

**Measurements:** (in  $\mu\text{m}$ ,  $n=3$ ): Body length 313-318 (av. 315), width 165-168 (av. 168), L/W 1.9. Length of setae (av.): *le* 21, *c* 26, *lm* 29, *lp* 27.

**Prodorsum:** The rostrum long and slender, its lateral margin slightly concave. About 8 lateral teeth present; 1st one largest, the rest small and equal in length, arranging like a teeth of saw. Setae *ro* strongly curved inwards, with cilia unilaterally in basal half. Tectopedial field well developed and comparatively large, opened ahead.

Between tectopedial fields found some large tubercles. Lamellar knob divided into two robust tubercles, each bearing a long lamellar seta. Sensillus has a fusiform head with a long pointed tip, outside with short bristles, arranging in a low. *Co.pl* and *co.pm* present: *co.pl* small and smooth, *co.pm* small and granulated. Posterior part of prodorsum densely granulated, except for the tectopedial field and the part between *co.nm*.

**Notogaster:** Ten pairs of notogastral setae. The setae moderately long and smooth, curved at basal portion: seta *c* not reaching the level of insertion of seta *ia*; seta *lm* inserted at a level posterior to *la*; seta *lp* anterior to seta *h<sub>3</sub>*. Anterior margin of notogaster without condyles but 1 pair of low swellings opposing *co.pm*. *RLN* of notogastral setae: *lm* 16, *lp* 16.

**Ventral aspect:** Ornamentation of epimeral region rather complicated: a vague network pattern on  $\text{ep}_{3,4}$ . Six pairs of genital setae: *g<sub>1</sub>* and *g<sub>2</sub>* long, about 2.4× as long as the remaining setae. Anal plate about 1.3× as long as genital plate. Anal seta *an<sub>2</sub>* inserted closer to lateral margin of anal plate than *an<sub>1</sub>* is. A curved angular ridge projecting backwards and connecting setae *ad<sub>1</sub>* behind anal plates. Seta *ag* about equal in length to setae *ad* and

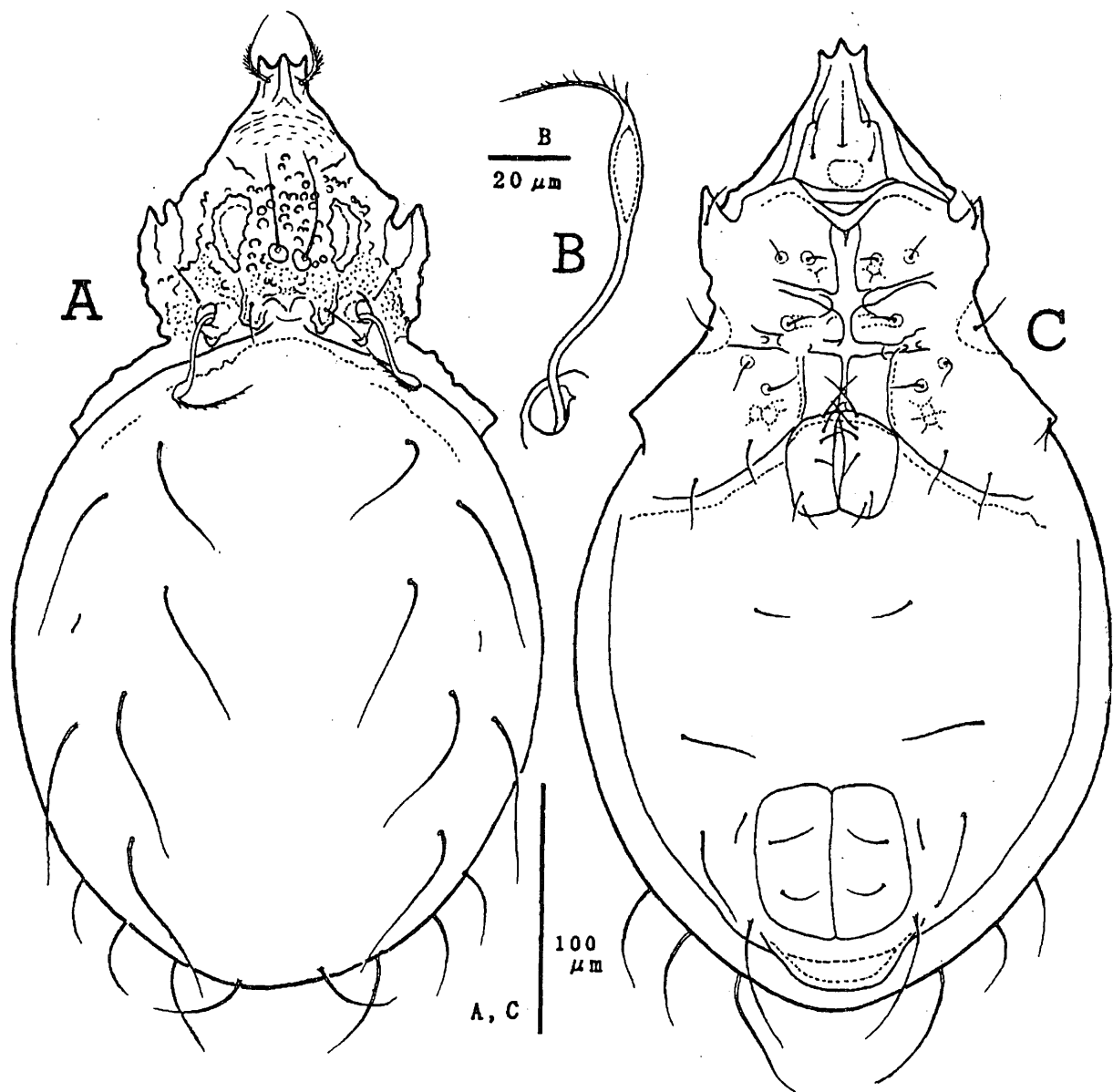


Fig.8: *Allosuctobelba tricuspidata satsumaensis* subsp. n. --- A: Dorsal aspect. B: Sensillus. C: Ventral aspect.

slightly longer than *an*. Relative length of setal interval:  $ag-ag > ad_3-ad_3$ .

**Remarks:** The new species is discriminated from the other species of the genus *Suctobelba* by the following points: 1) very long and slender rostrum, 2) about 8 lateral teeth arranged like a saw, 3) distinct and large tectopedial field, 4) fusiform sensillar head with a long pointed tip,

**Material examined:** Holotype (NSMT-Ac 11315), Senjogahara, Nikko, Tochigi-ken. 24-V-1977, S.

besetting with short bristles arranged in one low, 5) a curved ridge behind anal plates, 6) dorsal setae moderately long and smooth, curved at basal portion.

*Suctobelba simplex* sp. n.

[Namihiige-madodani]

(Fig.10)

CHINONE. From the litter under grove of *Quercus mongolica grosseserrata*. -- 5 paratypes (NSMT-Ac

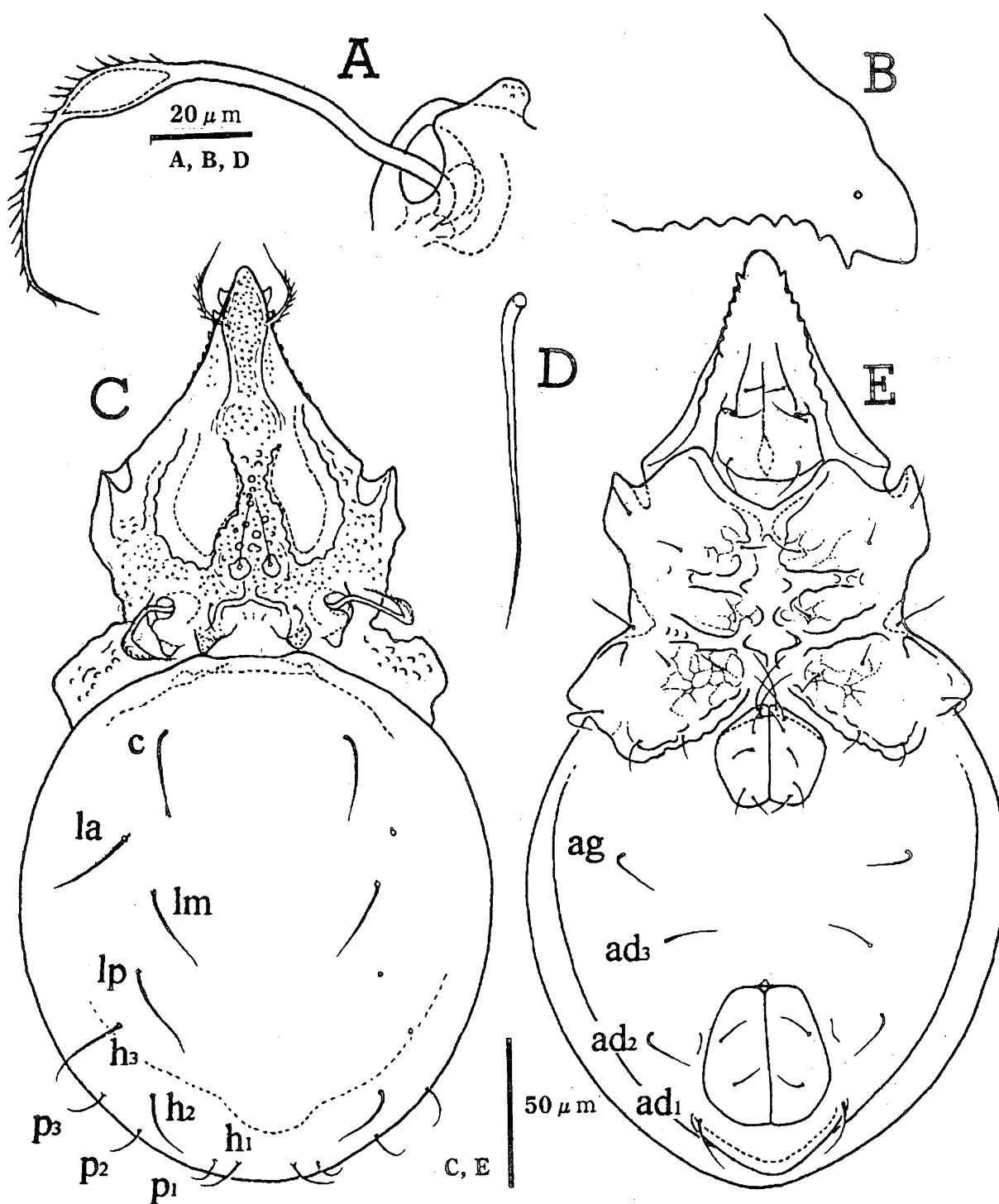


Fig.9: *Suctobelba serrata* sp. n. --- A: Sensillus. B: Rostral teeth in lateral view. C: Dorsal aspect. D: Notogastral seta. E: Ventral aspect.

11316 to 11320): the same data as the holotype. -- 2 exs.

Mt. Hanakame, Ibaraki-ken. 23-VIII-1984, S. CHINONE. From the litter under copse.--1 ex. Mt. Tatsuware,

Ibaraki-ken. 13-XI-1982, S. CHINONE. From the litter under grove of *Fagus crenata*. -- 1 ex. Mt. Kiyosumi, Chiba-ken. 18-XII-1983, S. CHINONE. From the litter under grove of *Abies firma*. -- 1 ex. the Kirishima Shrine,

Kirishima-machi, Kagoshima-ken, 31-III-1990, K. ISHII and H. SAKAYORI. From the litter under grove of *Cyclobalanopsis acuta*.

**Measurements:** (in  $\mu\text{m}$ ,  $n=5$ ): Body length 220-240 (av.240), width 115-125 (av.121). Length of setae (av.): *le* 12, *im* 21, *lp* 21.

**Prodorsum:** The rostrum bilaterally concave, followed by two angular teeth; from the side view, 3 or 4 and rather complicated teeth found as shown in Fig.10-A. Rostral setae directed laterad, weakly curved like a bow, rather thick, terminal one-third ciliated. Tectopedial fields widely opened ahead. Lamellar knob small and its anterior corner pointed. *Co.pm.* well developed, rather elongate triangular, with seta *in* on front edge. Sensillus has a long peduncle, curved at a middle point, and a slender fusiform head with some short bristles. The surface of prodorsum covered with many small granules except in the posterior half of tectopedial fields.

**Notogaster:** Ten pairs of notogastral setae. The setae setiform, medium long, curved at basal portion, rather equal in length to one another. The seta *la* located slightly nearer to *c* than to *lm*. Anterior margin of notogaster has no condyles, but three low swellings. Three pairs of lyrifissures, *ia*, *im* and *ip* observed. *RLN* of notogastral setae: *lm* 13, *lp* 14.

**Ventral aspect:** Six pairs of genital setae, about equal in length. Anal plate slightly larger than genital plate: about 1.2 $\times$  as long as genital plate. Relative length of setal interval: *ag-ag* > *ad*<sub>3</sub>-*ad*<sub>3</sub>.

**Remarks:** The new species is related to *Suctobelba aliena* MORITZ, 1970, but it is distinguishable from the latter by the following points: 1) the head of sensillus is slender with short bristles, while in *S. aliena* it is rather swollen without bristles, 2) the posterior half of tectopedial fields is smooth, but in *S. aliena* the fields is wholly covered with many granules.

#### Genus *Suctobelbata* GORDEEVA, 1991

[Gomahuri-madodani- zoku]

Type species: *Suctobelbata nova* GORDEEVA, 1991

**Diagnosis:** Nine or ten pairs of notogastral setae. Anterior margin of notogaster with 1 pairs of condyles bilaterally and with 1 unpaired low and wide swelling medially. Rostrum sometimes with some small teeth. Rostral setae bent like a knee or strongly curved inwards. One pair of swellings like a convex lens found behind *ro*.

Dorsal surface and epimeral region densely granulated.

**Distribution:** Russia (Kaluga), USA (Alaska), and Japan.

#### Key to the Japanese Species of the Genus *Suctobelbata*

- 1 (2) Sensillar head spindle-shaped, with about 12 bristles at the outer side. Notogastral setae thin setiform ----- *S. punctata* HAMMER, 1955
- 2 (1) Sensillar head clavate with many short bristles. Notogastral setae thick, with narrow fins bilaterally in distal half ----- *S. hirauchiae* sp. n.

#### *Suctobelbata punctata* (HAMMER, 1955)

[Gomahuri-madodani]

(Fig.11)

*Suctobelba punctata* HAMMER, 1955, p.11, fig.4.

*Suctobelbata punctata*: GORDEEVA, 1991, p.45.

**Material examined:** 12 exs., Shirakami mountainous district, Fujisato-machi, Akita-ken. 27-VIII-1994. From litter under forest of *Fagus crenata*. --- 3 exs.: Bunao-toge, Toyama-ken. 6-X-1996, Y. HIRAUCHI. From litter in the forest of *Fagus crenata*. --- 1 ex.: Mt. Setokura, Toyama-ken. 10-V-1998, Y. HIRAUCHI. From litter of *Fagus crenata*. --- 2 exs.: Bijodaira, Mt. Tateyama, Toyama-ken. 10-V-1998, Y. HIRAUCHI. From litter of *Fagus crenata*.

**Measurements:** (in  $\mu\text{m}$ ,  $n=5$ ): Body length 265-283 (av.275), width 138-150 (av.144), L/W 1.9. Length of setae (av.): *le* 25, *c* 29, *lm* 22, *lp* 29.

**Prodorsum:** Rostrum with bridge-like swelling, apically rounded, and bilaterally with a sharp triangular tooth, followed by about 6 small teeth arranged in a row. Seta *ro* slightly bent like a knee, coarsely barbed unilaterally at distal half. One pair of swellings like a convex lens found behind setae *ro*. Tectopedial field comparatively large, closed ahead. Lamellar knob roundish triangular, pointed at anterior part. Seta *le* thin and medium long, 2 $\times$  as long as *in*. The head of sensillus slender, rather flat spindle-shape, with about 12 bristles arranged in a row at the outer side. *Co.pm* and *co.pl* present. Dorsal surface of prodorsum densely granulated; the granules of tectopedial fields exist on the bottom of field.

**Notogaster:** Notogastral condyles weakly developed:

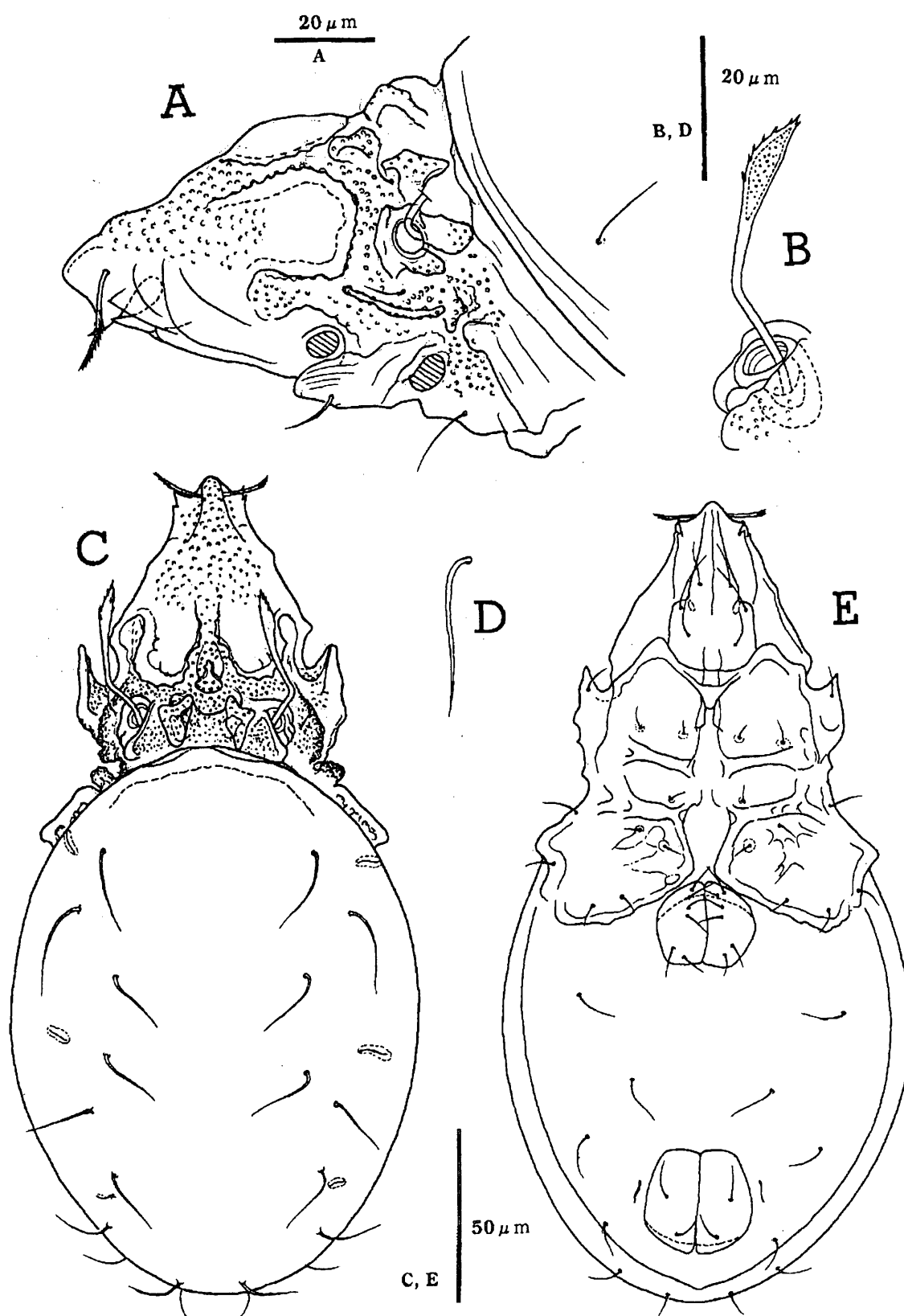


Fig.10: *Suctobelba simplex* sp. n.--- A: Prodorsum in lateral view. B: Sensillus. C: Dorsal aspect. D: Notogastral seta. E: Ventral aspect.

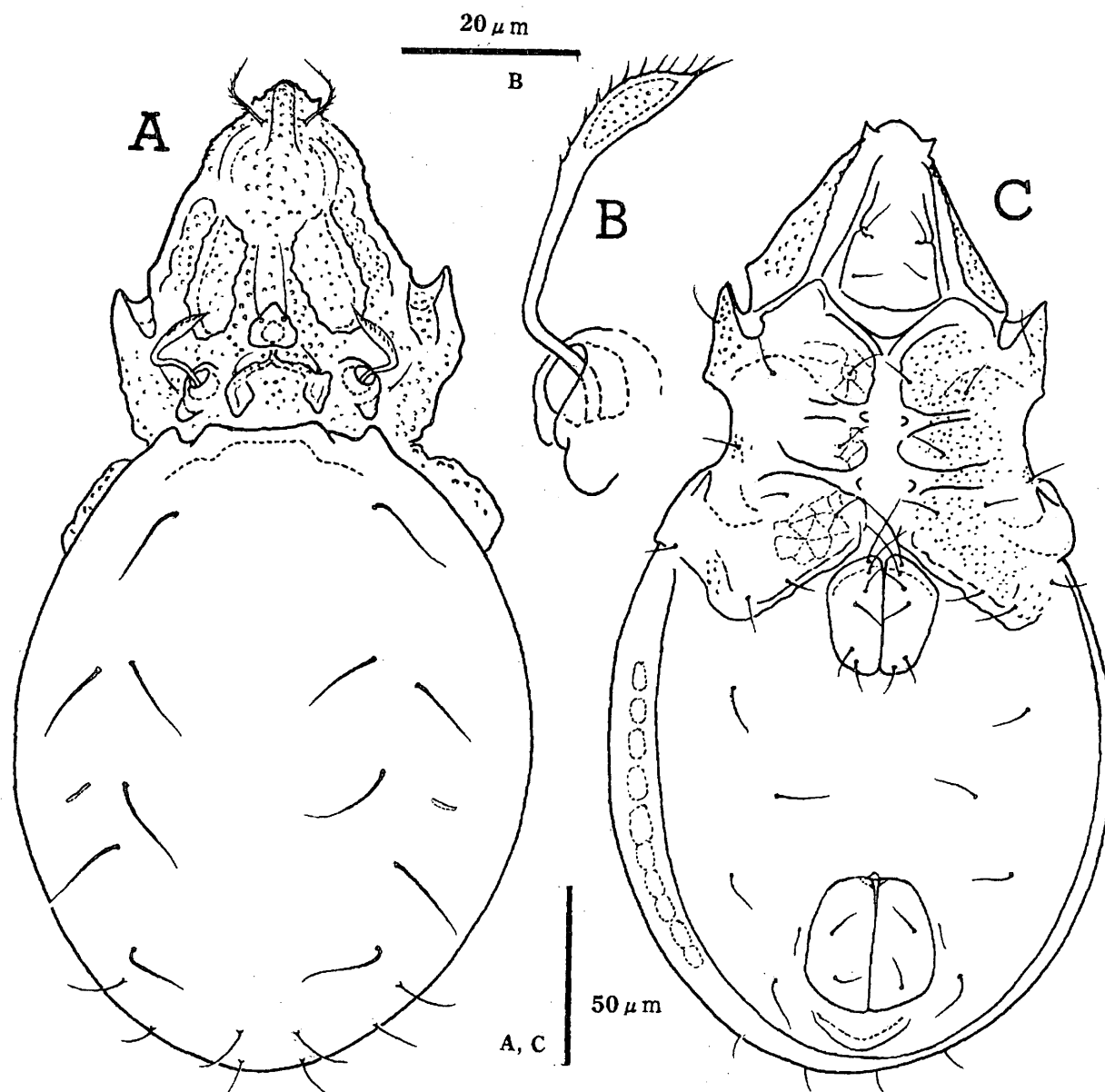


Fig.11: *Suctobelbata punctata* (HAMMER, 1955).--- A: Dorsal aspect. B: Sensillus . C: Ventral aspect.

*co.nl* rather projecting, but *co.nm* low like swellings. Ten pairs of notogastral setae. The setae moderately long and smooth, curved at basal portion: seta *lm* inserted near *la*, at a level slightly anterior to *la*; seta *lp* anterior to *h*<sub>3</sub>. *RLN* of notogastral setae: *lm* 12, *lp* 16.

**Ventral aspect:** Six pairs of genital setae; *g*<sub>1</sub> and *g*<sub>2</sub> long, about 2× as long as the remaining setae. Anal plate about 1.2× as long as genital plate. Epimeral region with a vague net-work pattern and granules. Cusp sharp, triangular. Fissure *iad* existing at a level anterior to *ad*<sub>2</sub>. Behind anal plate a short transverse ridge, projecting

posterior. Setae *ag* about equal in length to setae *ad* and *an*. Relative length of setal intervals:  $ag-ag \geq ad_2-ad_2 > ad_3-ad_3 \geq ad_1-ad_1$ .

**Remarks:** The Japanese specimens well agree in detail with the Alaskan ones described by HAMMER, 1955, though she did not describe ventral aspect. The slight differences between them are (1) the body rather small in the Japanese ones, (2) the rostral setae barbed in the Japanese species, while smooth in the Alaskan ones.

**Distribution:** USA (Alaska), and Japan.

***Suctobelbata hirauchiae* sp. n.**

[Hirauchi-madodani]

(Fig.12)

**Material examined:** Holotype (NSMT-Ac 11321), Bijodaira, Mt. Tateyama, Toyama-ken. 10-V-1998, Y. HIRAUCHI. From litter under the forest of *Fagus crenata*.

**Measurements:** (in  $\mu\text{m}$ ,  $n=1$ ): Body length 315, width 188, L/W 1.7. Length of setae: *le* 18, *c* 30, *lm* 23, *lp* 20.

**Prodorsum:** Rostrum with bridge-like swelling, and bilaterally with one pair of blunt teeth. Seta *ro* strongly curved inwards and barbed on the outside. Tectopedial field large, distinctly edged, its anterior margin closed and pointed. Lamellar knob nearly pentagonal in shape. Setae *le* long, about 2 $\times$  as long as these mutual distance. Prodorsal condyle *co.pm* and *co.pl* present. Some short ridges and tubercles found on rostral area and in front of lamellar knob. Sensillus has a clavate head with many short bristles. Dorsal surface densely granulated.

**Notogaster:** Nearly oval shape in dorsal view. Notogastral condyle *co.nl* well developed, but *co.nm* developed weakly, being low swellings. Ten pairs of notogastral setae. The setae rather long and thick, with narrow fins bilaterally at distal half. Seta *lm* inserted near *la*, at a level slightly posterior to *la*. Seta *h*<sub>1</sub> about equal in length to seta *h*<sub>3</sub>. *RLN* of setae: *lm* 11, *lp* 9.

**Ventral aspect:** Six pairs of long genital setae: *g*<sub>1</sub> and *g*<sub>2</sub> about equal in length to the remaining genital setae. Anal plate 1.3 $\times$  as long as genital plate. Epimeral region with a network pattern and densely granulated. Epimeral setae rather long.

**Remarks:** The new species is closely related to *Suctobelba punctata* HAMMER 1955, but differs from the latter in the following points: 1) thick dorsal setae with narrow fins bilaterally at distal half, 2) clavate head of sensillus beset with many short bristles.

**Etymology:** The species was named after Mrs. Yoshiko HIRAUCHI, who kindly sent me many precious specimens.

**Genus *Kathetosuctobelba* gen. n.**

[Fukure-madodani- zoku]

Type species: *Rhinosuctobelba makarcevi* KRIV. et GOLOSOVA in GOLOSOVA & TARBE, 1974

*Rhinosuctobelba makarcevi* was described by

KRIVOLUTSKY et GOLOSOVA in 1974 as the second species of the genus *Rhinosuctobelba*, but the author believes that this species belongs neither to the genus *Rhinosuctobelba* nor to the other known genera because of the morphological differences. Therefore, a new genus *Kathetosuctobelba* is created for *R. makarcevi*.

**Diagnosis:** Ten pairs of notogastral setae. Condyles on the anterior margin of notogaster not developed, showing low swellings. Rostral setae bent like a knee. Rostrum rounded or gently truncate neither with teeth nor incision. The tectopedial fields not well defined, and their front ridges reduced. The area behind rostrum smooth and widely swollen. Lamellar knob roundish, nearly semicircular in shape. Sensillus possessing a long slender pectinate head with bristles in a row. Posterior parts of prodorsum densely granulated. Six pairs of genital setae.

**Etymology:** The new generic name is derived from a Greek word "Kathetos" which means "plump" in English.

**Distribution:** Georgia (Abkhasia), and Japan.

***Kathetosuctobelba makarcevi* (KRIV. et GOLOSOVA, 1974) comb. n.**

[Fukure-madodani]

(Fig.13)

*Rhinosuctobelba makarcevi* KRIV. et GOLOSOVA, 1974 in GOLOSOVA & TARBE, 1974. p.1886, Figs.4-8.

**Material examined:** 4 exs. Mt. Hanakame, Ibaraki-ken. 23-VIII-1984. S. CHINONE. From the litter under copse. --- 1 ex. Mt. Hanakame, 15-V-1994. From litter under forest of *Abies firma*, *Fagus crenata*, *Quercus acutissima*, *Acer* sp.--1 ex. Mt. Yamizo, Ibaraki-ken. 13-VII-1986. S. CHINONE. From litter under forest of *Fagus crenata*. --- 1 ex. Bunao-toge, Toyama-ken. 6-X-1996. Y. HIRAUCHI. From litter under grove of *Fagus crenata*. --1 ex. Shirakami Mountainous district, Fujisato-machi, Akita-ken. 27-VIII-1994. From litter under forest of *Fagus crenata*.

**Measurements:** (in  $\mu\text{m}$ ,  $n=4$ ): Body length 225-250 (av. 240), width 130-143 (av. 138). Length of setae (av.): *le* 15, *c* 20, *lm* 16, *lp* 15.

**Prodorsum:** Rostrum smooth, rounded or truncate neither with teeth nor incision. Tectopedial fields not well defined and widely opened anteriorly, with some vague oval or network spots at the posterior corner.



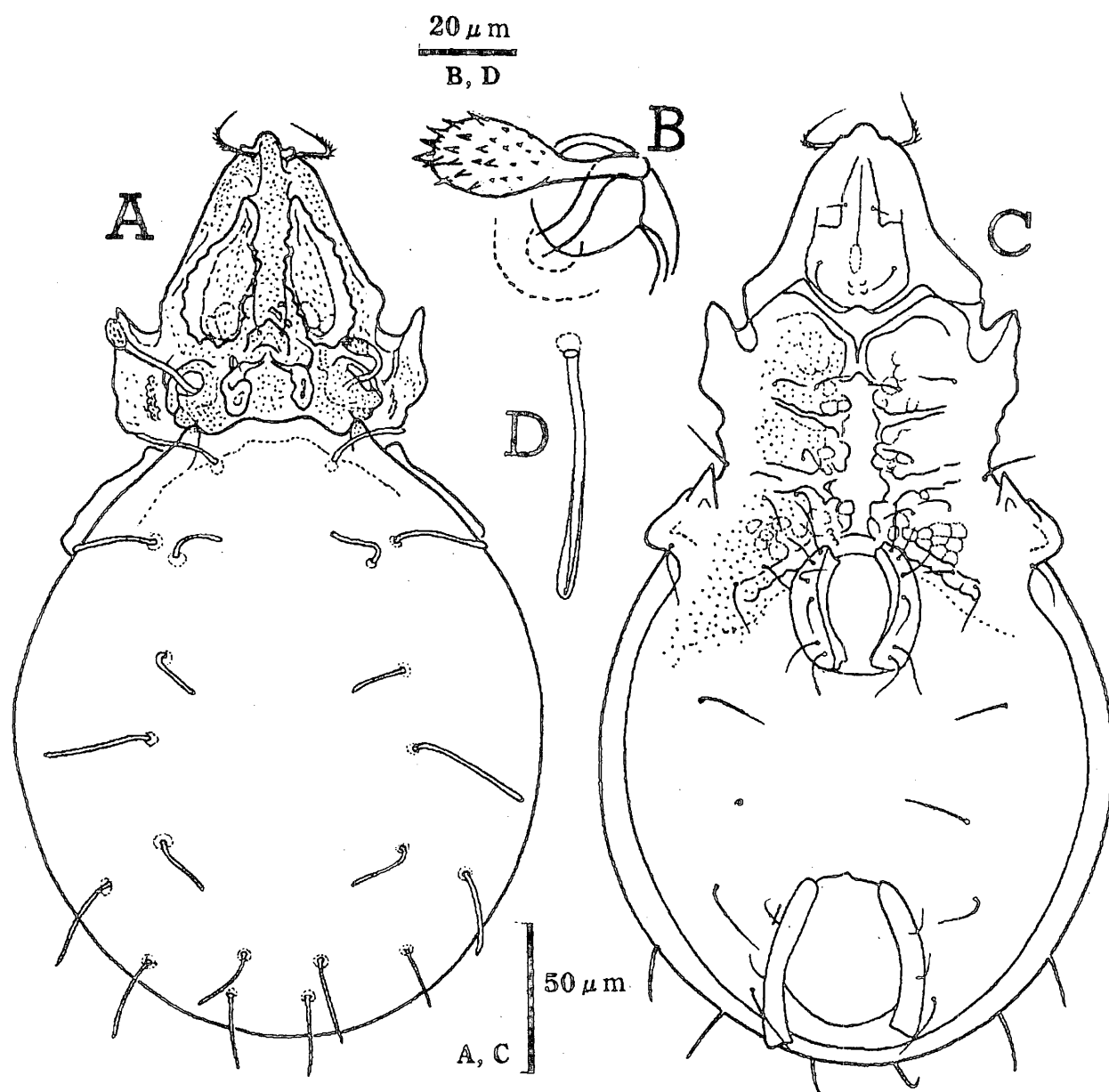


Fig.12: *Suctobelbata hirauchiae* sp. n. --- A: Dorsal aspect. B: Sensillus. C: Ventral aspect. D: Notogastral seta.

The area behind rostrum smooth and strongly swollen. Lamellar knob roundish, nearly semicircular in shape. Seta in short, equal as long as seta ex. Seta *le* medium long, about  $2.0 \times$  as long as seta in. Posterior part of prodorsum densely granulated. Sensillus has a slender head, with about 12 bristles in one row.

**Notogaster:** Condyles of anterior margin of notogaster weakly developed, showing 2 pairs of low swellings. Ten pairs of notogastral setae. The setae short, setiform,

curved at basal portion, rather equal in length to one another. Seta *la* located nearer to *lm* than to *c*. Two pairs of lyrifissures, *ia* and *im* are observed; *im* at a level to seta *ms*. *RLN* of notogastral setae: *lm* 10, *lp* 9.

**Ventral aspect:** Six pairs of genital setae, about equal in length. Epimeral seta rather long, about equal to seta *ag* and *ad*. Anal plate slightly larger than genital plate, about  $1.2 \times$  as long as genital plate. Relative length of setal intervals:  $ag-ag > ad_3-ad_3$ .

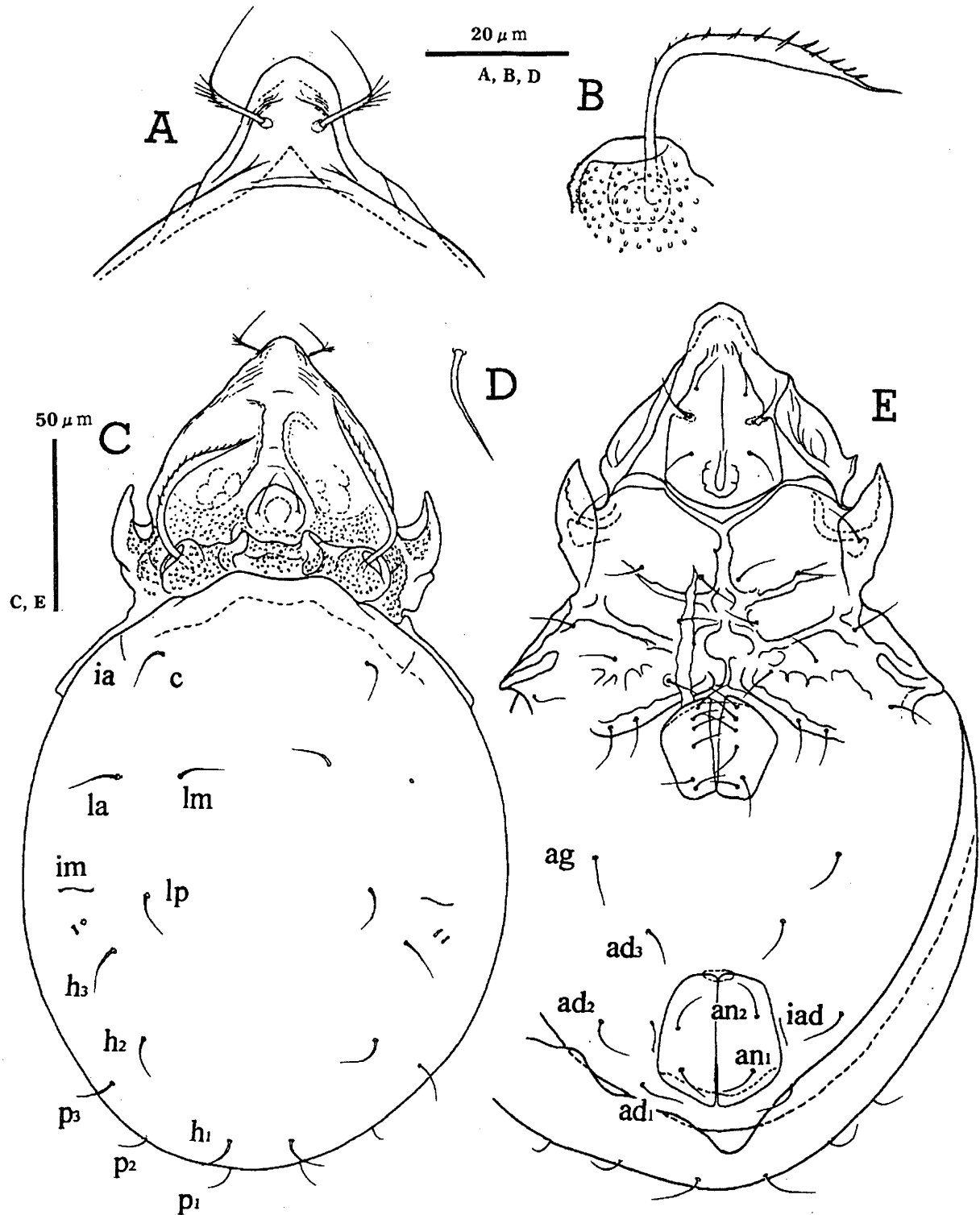


Fig.13: *Kathetosuctobelba makarcevi* (KRIV. et GOLOSOVA, 1974) comb. n.--- A: Rostrum in dorsal view. B: Sensillus. C: Dorsal aspect. D: Notogastral seta. E: Ventral aspect.

**Remarks:** The Japanese specimens well accord with *Kathetosuctobelba makarcevi* (KRIV. et GOLOSOVA, 1974) comb.n. and this species seems to have the following diagnostic characters: 1) lamellar knob large, roundish, often semicircular in shape, 2) sensillus has a long slender head, with about 12 bristles arranged in a row, 3) rostrum rounded or truncate neither with teeth nor incisions, 4) notogastral setae short and setiform, 5) the area behind rostrum smooth and widely swollen, 6) tectopedial fields opened widely anteriorly.

**Distribution:** Georgia (Abkhazia) and Japan.

### Genus *Suctobelbida* JACOT

[Madodanimodoki-zoku]

*Suctobelbida* JACOT, 1937

Type species: *Suctobelbida punctillata* JACOT, 1937

**Diagnosis:** Ten pairs of notogastral setae. The setae rather short. Anterior margin of notogaster generally with 1 pair of condyles bilaterally and with 1 unpaired obtuse projection medially. Notogastral surface with 3 or 4 pairs of excrescences, each emitting sometime a notogastral seta, and densely granulated. Six pairs of genital setae: usually  $g_3$  inserted close to lateral margin of notogaster.

**Distribution:** Cameroon, Cuba, Indonesia (Borneo, Java), New Zealand, Peru (Andes Mountains), Tanzania, USA (Illinois, North Carolina), and Japan.

### Key to the Japanese species of the genus *Suctobelbida*

- 1(2) Notogastral surface without excrescences and depressions. Sensillar head expanded and serrated in lateral view ----- *S. densipunctata* sp. n.
- 2(1) Notogastral surface with excrescences or depressions ----- 3
- 3(4) Notogastral setae ( $lm$ ,  $lp$ ,  $h_2$ ,  $h_3$ ) feather-like ----- *S. pennisetia* sp. n.
- 4(3) Notogastral setae setiform ----- 5
- 5(6) Notogastral surface with depressions. Sensillar head fusiform with long bristles densely ----- *S. kiyosumiensis* sp. n.
- 6(5) Notogastral surface with some pairs of excrescences. Sensillar head with no bristles ----- *S. tuberculata* AOKI, 1970

*Suctobelbida densipunctata* sp. n.

[Zarame-madodanimodoki]

(Fig.14)

**Material examined:** Holotype (NSMT-Ac 11322), The Saikoh Temple, Hayato-cho, Kagoshima-ken. 20-III-1990. K. ISHII, & H. SAKAYORI. From litter under laurel forest.--- 1 paratype (NSMT-Ac 11323): the same data as the holotype.

**Measurements:** (in  $\mu\text{m}$ ,  $n=2$ ): Body length 178-183 (av. 181), width 107-108 (av. 108), L/W 1.7. Length of setae (av.):  $le$  8,  $c$  7,  $lm$  7,  $lp$  7.

**Prodorsum:** Rostrum rounded, bilaterally followed by 4 or 5 teeth: the teeth small and pointed at tip as shown in Fig.14-B. Rostral setae smooth, gently incurved and inserted in lateral position. Median part of prodorsum with some short transverse ridges, some of them connected with each other by longitudinal thin ridges, forming irregular meshes. Tectopedial fields small and polygonal in shape. Seta  $le$  arising from each low small round tubercle. The outer border of the head of sensillus with broad rugged rim. Setae in arising outer side of tubercles on the transverse ridge between bothridia.  $Co.pl$  and  $co.pm$  present. Prodorsal surface densely covered with small granules.

**Notogaster:** One pairs of notogastral condyles  $co.nl$  distinct, obtuse at tip;  $co.nm$  absent. Ten pairs of notogastral setae. The setae short and straight. Seta  $c$  inserted at a level slightly anterior to  $la$ . Three pairs of small areae porosae present:  $Aa$  inside and at a level to  $c$ ,  $A_1$  near to  $lp$ ,  $A_2$  near to seta  $h_2$ . Dorsal surface granulated unevenly: granules of anteromedian area larger than those of circumferential area. *RLN* of setae:  $lm$  6,  $lp$  5.

**Ventral aspect:** Six pairs of genital setae: the setae short and about equal in length to one another;  $g_3$  inserted close to lateral margin of genital plate. Seta  $ag$  a little longer and thicker than the remaining ventral setae. Anal plate  $1.2\times$  as long as genital plate. Ventral surface also densely granulated except in the area between genital plate and anal plate. Fissure  $iad$  aligned at a level to  $an_2$ . A transverse curved ridge behind setae  $ad_1$ .

**Remarks:** The new species is closely related to *Suctobelbida pocsi* BALOGH et MAHUNKA, 1980 and *S. dentata* (HAMMER, 1961), however, it differs from the latter two species in the following points: 1) granules of anterior median surface of notogaster large and distributed densely, 2)  $co.nl$  larger than those of *S. dentata*, but not larger than those of *S. pocsi*, 3) setae  $ag$  rather thick and

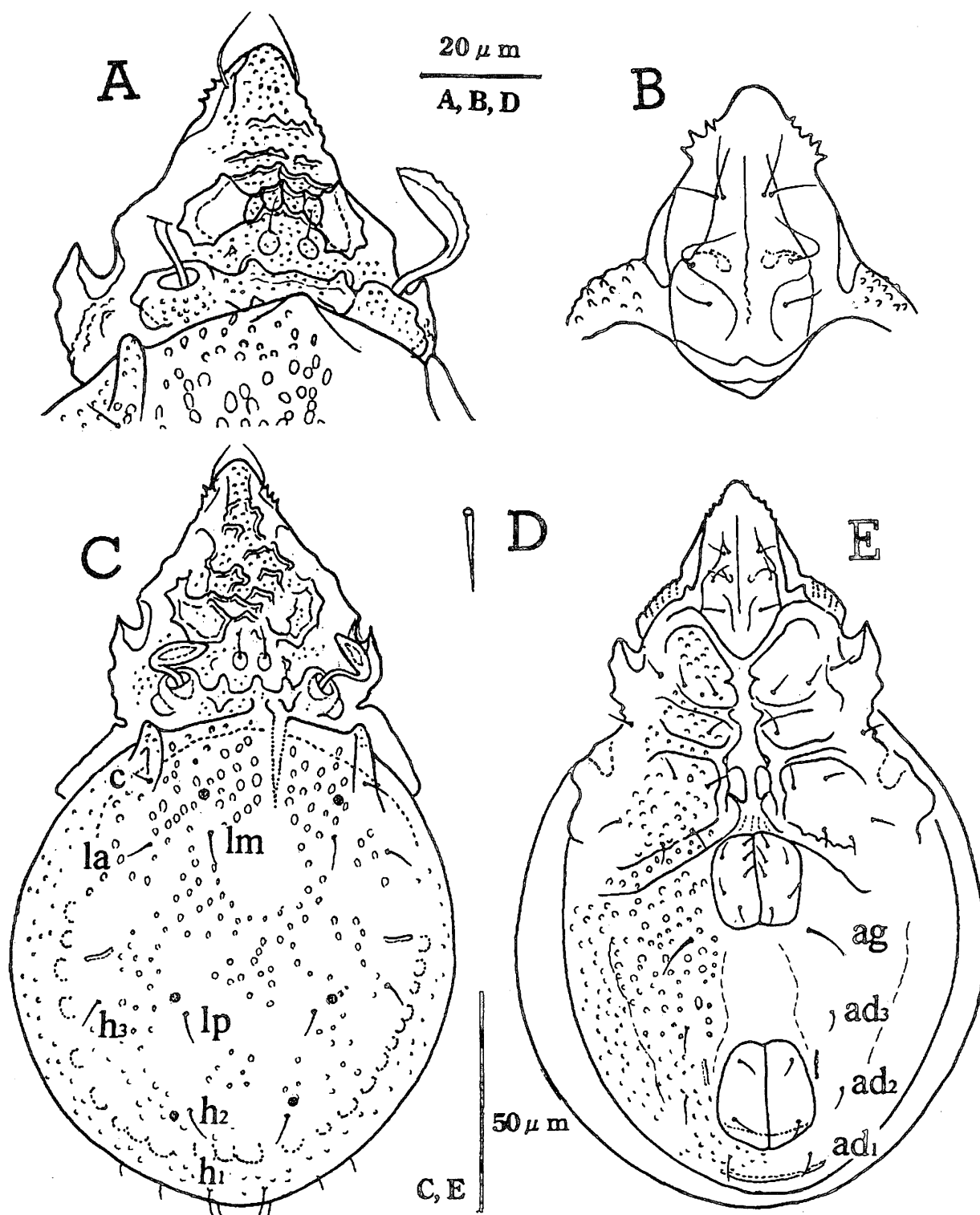


Fig.14: *Suctobelbila densipunctata* sp. n. --- A: Prodorsum in dorsal view. B: Rostral area in ventral view. C: Dorsal aspect. D: Notogastral seta. E: Ventral aspect.

setiform, not spatulate like as *S. pocsi*.

*Suctobelbilla penniseti* sp. n.

[Umoh-madodanimodoki]

(Fig.15)

**Material examined:** Holotype (NSMT-Ac 11324), Mt. Kiyosumi, Chiba-ken. 18-XII-1983. S. CHINONE. From litter under forest of *Abies firma*. --- 1 paratype (NSMT-Ac 11325): the same data as the holotype. --- 1 ex. Hamada-shi, Shimane-ken. 27-III-1983. S. CHINONE. From litter under grove of *Pinus densiflora*.

**Measurements:** (in  $\mu\text{m}$ ,  $n=3$ ): Body length 204-205. width 107-116, L/W 1.8. Length of setae: *le* 8, *c* 10, *lm* 10, *lp* 12.

**Prodorsum:** Rostrum conical, without teeth. Rostral seta smooth, incurved gently. Median part of prodorsum decorated with several short transverse ridges; each ridge short and irregular. Tectopedial field developed a little. Lamellar knob absent but sometimes consisting of two low swellings, each with seta *le*: *le* about 1.5 $\times$  as long as its mutual distance. Setae in short and discernible, situating on tubercles of transversal ridge between bothridia. Sensillar head fusiform, with many short bristles on outer surface.

**Notogaster:** One pair of large lateral condyles (*co.nl*) and a medial obtuse projection present. Between *co.nl*, 2 pairs of incurved vertical keels found: outer ones bearing setae *c* at the front portion; among inner ones the surface slightly concave and with many granules. Two pairs of small oval spots existing between two keels. Ten pairs of notogastral setae showing 2 types: feather form as seta *lm*, *lp*, *h*<sub>2</sub>, and *h*<sub>3</sub>, and setiform as the remaining dorsal setae. Seta *la* long, straight, inserted on curved ridge. Seta *p*<sub>2</sub> short and thin, inserted on curved ridges. Dorsal surface with some depressions as shown in Fig.15-C. These depressions not granulated, having 2 pairs of areae porosae (*a*<sub>1</sub> and *a*<sub>2</sub>). In posterior one found three spots. *RLN* of setae: *lm* 7, *lp* 8.

**Ventral aspect:** Epimera I and II separated clearly by 1 pair of sternal ridges. Epimera III-IV with 2 pairs of sternal ridges on both side of sternal ridge. Epimeral region divided by long transverse arched ridge from genito-anal region. Six pairs of genital setae: all setae short, *g*<sub>3</sub> inserted close to lateral margin of the plate. Anal plate large, about 1.9 $\times$  as long as genital plate. One pair of depressions with no granulation found outside of setae

*ag*. Ventral surface granulated except on ridges and depressions.

**Remarks:** The new species is easily separated from its congeners by the feather-like notogastral setae and the pattern of notogastral surface.

*Suctobelbilla kiyosumiensis* sp. n.

[Kiyosumi-madodanimodoki]

(Fig. 16)

**Material examined:** Holotype (NSMT-Ac 11326), Mt. Kiyosumi, Chiba-ken. 18-XII-1983. S. CHINONE. From litter under forest of *Abies firma*. --- 1 paratype (NSMT-Ac 11327): the same data as the holotype.

**Measurements:** (in  $\mu\text{m}$ ,  $n=2$ ): Body length 195-200, width 108-110, L/W 1.8. Length of setae: *le* 7, *c* 7, *lm* 7, *lp* 7.

**Prodorsum:** Rostrum protruding, with minute granules, and followed posteriorly by some tubercles and short ridges, divided by vertical ridges on both sides. Rostral setae smooth incurved, arising a little behind about three small lateral teeth. Tectopedial fields weakly developed; its inner ridges short. Setae *le* 1.6 $\times$  as long as its mutual distance, arising from slightly swollen tubercle. Setae in very short and indistinct, situated on the outside of tubercles of transversal ridge between bothridia. Median and posterior surface densely granulated. Prodorsal condyle *co.pl* and *co.pm* present. Head of sensillus fusiform, with long bristles densely on its outer surface.

**Notogaster:** Notogastral condyle *co.nl* large, but *co.nm* absent. Dorsosejugal suture medially prominent. Two pairs of longitudinal ridges present: outer one incurved at posterior end, with seta *c* at anterior position; inner one short and aligning transversely; between two ridges found one or two small spots. Dorsal surface with some depressions: a median longitudinal one large and smooth, 1st pairs of lateral ones oblong, 2nd pairs oval and a median posterior one with some oval spots. Ten pairs of notogastral setae: all very short, thin setiform. Posterior border of notogaster with a pair of tubercles. Dorsal surface granulated except for the region of depressions. *RLN* of setae: *lm* 5, *lp* 5.

**Ventral aspect:** Six pairs of short genital setae: *g*<sub>3</sub> inserted close to lateral margin of genital plate; *g*<sub>4</sub>, *g*<sub>5</sub> and *g*<sub>6</sub> represented merely by setal pores. Anal plate about 1.3 $\times$  as long as genital plate. Setae *an*<sub>1</sub> found merely as setal pores.

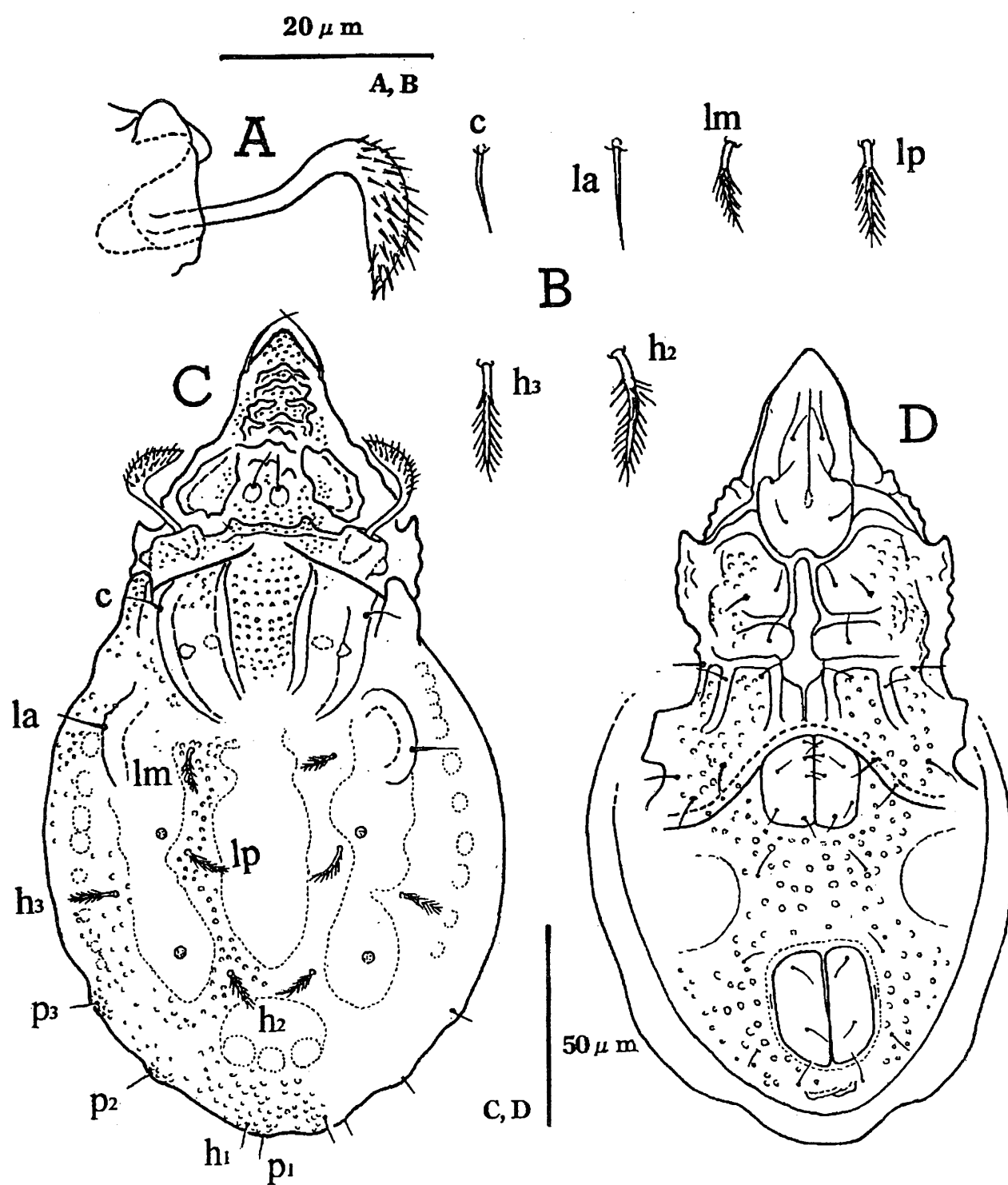


Fig.15: *Suctobelbila penniseti* sp. n.--- A: Sensillus. B: Notogastral setae. C: Dorsal aspect. D: Ventral aspect.

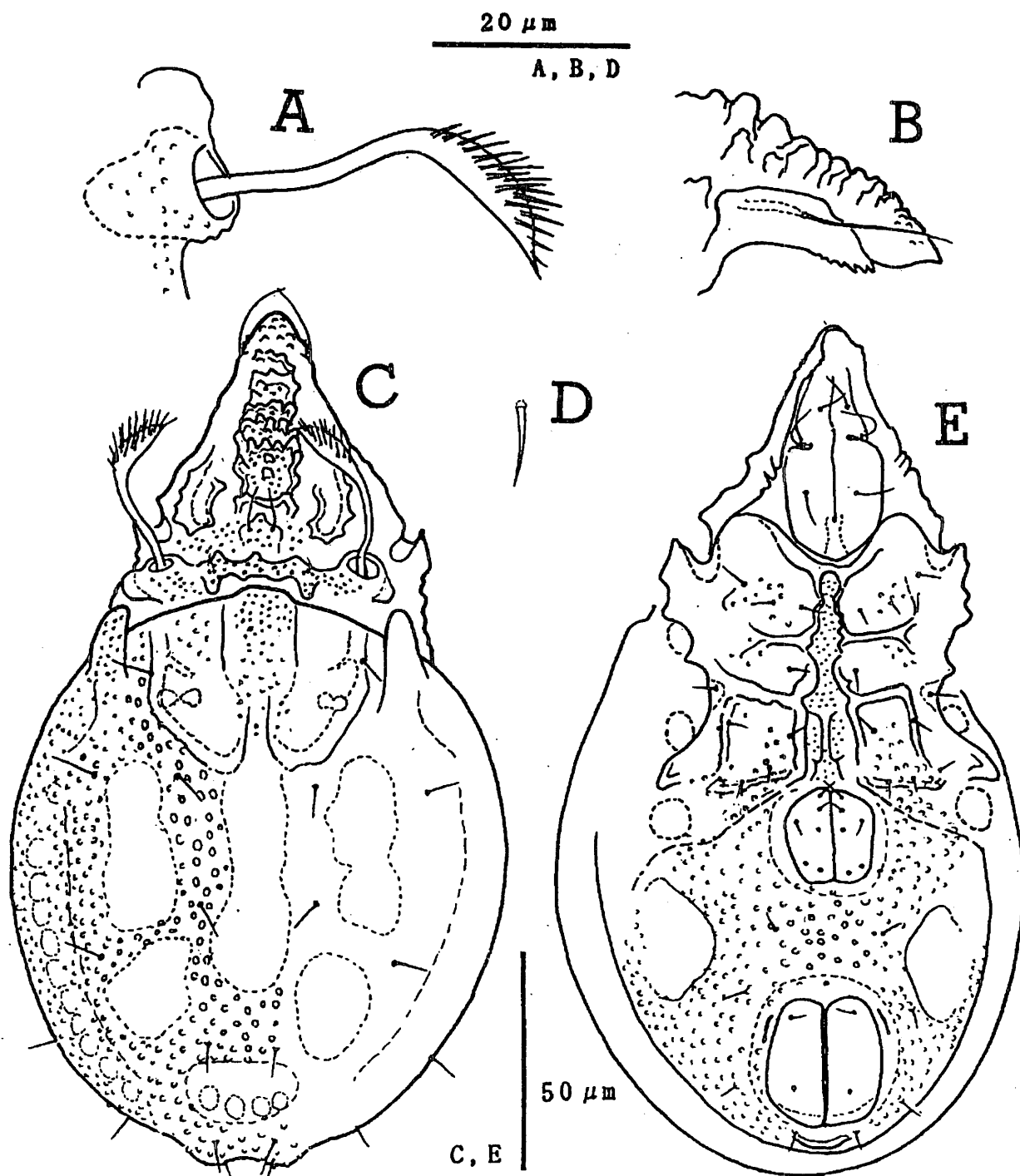


Fig.16: *Suctobelbula kiyosumiensis* sp. n.--- A: Sensillus. B: Rostrum in lateral view. C: Dorsal aspect. D: Notogastral seta. E: Ventral aspect.

One pair of depressions existing outside of setae *ag*, its area with no granules. Ventral surface densely granulated: the granules large between anal and genital plates. Relative length of setal intervals:  $ad_2-ad_2=ad_3-ad_3 > ag-ag > ad_1-ad_1$ . A short ridge found just behind setae *ad*<sub>1</sub>.

**Remarks:** The new species is closely related to *Suctobelbilla cornuta* BALOGH et MAHUNKA, 1974, but differs from the latter by the following points: 1) head of sensillus with long bristles densely; the latter one with short bristles, 2) notogastral surface widely granulated; granules of the latter species limited to anterior areas.

***Suctobelbilla tuberculata* AOKI, 1970**

[Madodanimodoki]

(Fig.17)

*Suctobelbilla tuberculata* AOKI, 1970. p.424, figs.67-71.

New localities from Japan: 6 exs.: Mt. Kiyosumi, Chiba-ken. 18-XII-1983. S. CHINONE. From litter under forest of *Abies firma*.---1 ex.: Yakeyamazawa, Fujiwara-machi, Tochigi-ken. 7-X-1995. From litter under grove of *Kalopanax pictus*, *Castanea crenata*, *Zelkova serrata* and *Acer palmatum palmatum*.---2 Exs.: Kurosawa, Ome-shi, Tokyo-to. 29-X-1997. Junichi AOKI. From litter under grove of *Cryptomeria japonica*. ---3 exs.: Kubokawa-machi, Kochi-ken. 23-X-1983. S. CHINONE. From litter under grove of *Castanopsis cuspidata*, *Cinnamomum camphora*. 1 ex.: Tatsukushi Cape, Tosashimizu-shi, Kochi-ken. 22-X-1980. S. CHINONE. From litter under grove of *Machilus thunbergii grosseserrata*.--- 4 exs.: Hamada-shi, Shimane-ken. 27-III-1972. From litter under grove of *Pinus densiflora*. S. CHINONE.---2 exs.: The tropical botanical garden, Okinawa-ken, 5-V-1974. S. CHINONE.---2 exs.: Beppu-shi, Ohita-ken, 29-III-1990. H. SAKAYORI & T. USHIRODA. From litter under laurel forest. --- 1 ex.: Enada, Usuki-shi, Ohita-ken, From litter under *Cryptomeria japonica* and the laurel forest. The other data as the same as the former.---2 ex.: Kirishima-cho, Kagoshima-ken, 31-III-1990. K. ISHII & H. SAKAYORI. From litter grove of *Cyclobalanopsis acuta*.

**Remarks:** The specimens examined well agree with the original description, but the tectopedial field is rather distinct and the number of notogastral excrescences is larger than those of original description. This latter difference may be due to the position of the specimen in the preparation.

**Distribution:** Japan.

**Genus *Novosuctobelba* HAMMER, 1977**

[Kataharimadodani-zoku]

Type species: *Novosuctobelba dentissima* HAMMER, 1977

**Diagnosis:** Ten pairs of notogastral setae. One pair of well developed condyles on the anterior margin of notogaster. Rostral setae bent like a knee. Rostrum rounded apically. Tectopedial fields well defined. Lamellar knob large and semicircular in shape. Head of sensillus club-shaped or splendidly crescent-shaped with bristles arranging in one low. Prodorsum densely granulated except the tectopedial fields. Six pairs of genital setae.

**Distribution:** Pakistan, and Japan.

**Key to the Japanese species of the genus *Novosuctobelba***

- 1(2) Rostrum protruding, with only one tooth laterally. Tectopedialfield well closed at anterior end -----  
----- *N. monodentis* sp.n.
- 2(1) Rostrum roundish with two teeth. Tectopedialfield widely opened at anterior end --- *N. latirostrata* sp.n.

***Novosuctobelba monodentis* sp. n.**

[Hitotsuba-kataharimadodani]

(Fig.18)

**Material examined:** Holotype (NSMT-Ac 11328), Mt. Kaba, Ibaraki-ken. 9-V-1982. S. CHINONE.--- 1 paratype (NSMT-Ac 11329): the same data as the holotype.---2 paratypes (NSMT-Ac 11330 and 11331): 27-VI-1986. From litter under grove of *Quercus serrata*. The other data same to the holotype.--- 2 exs. Tone-machi, Ibaraki-ken, 27-V-1979. S. CHINONE. From litter under grove of *Pinus densiflora*. --- 4 exs. Tamada, Asahi-mura, Ibaraki-ken, 9-V-1979. S. CHINONE. From litter under grove of *Pinus thunbergii*. --- 2 exs. Mt. Yamizo, Ibaraki-ken, 28-IX-1981, S. CHINONE. --- 1 exs. Mt. Daisetsu, Hokkaido, 27-VII-1983. S. CHINONE. ---1 ex Shirakami Mountainous district, Fujisato-machi, Akita-ken. 27-VIII-1994. From litter under forest of *Fagus crenata* and *Pterocarya rhonifolia*.---1 ex. Ohtani, Uotsu-shi, Toyama-ken. 18-V-1997. Y. HIRAUCHI. From litter under forest of *Quercus serrata*.--- 1 ex. Mt. Kiyosumi, Chiba-ken.



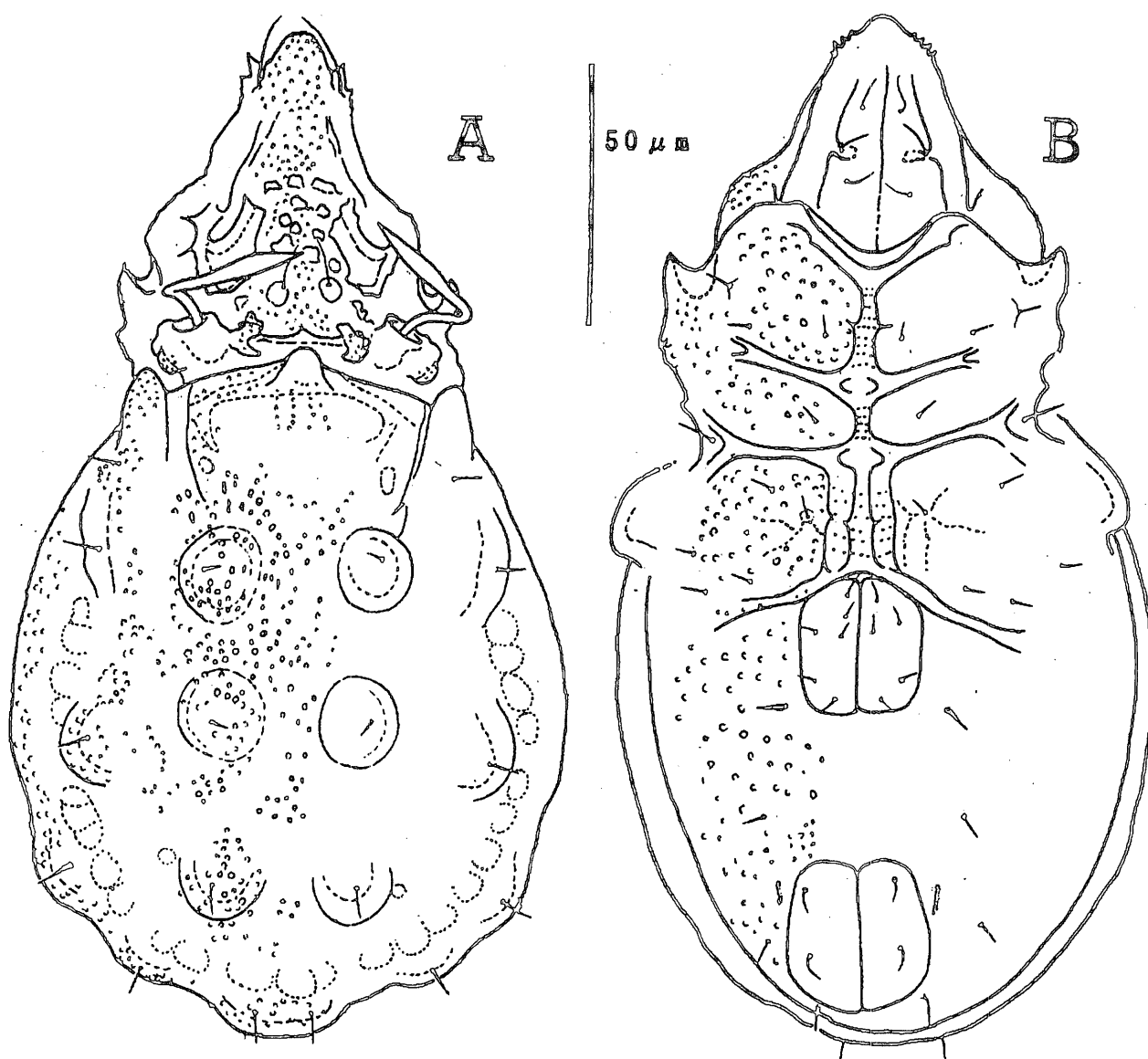


Fig.17: *Suctobelbilla tuberculata* AOKI, 1970.--- A: Dorsal aspect. B: Ventral aspect.

18-XII-1983. S. CHINONE. From litter under forest of *Abies firma*.---1 ex. Mt. Hiei, Kyoto. 25-IV-1973. S. CHINONE. From litter under grove of *Cryptomeria japonica*.--- 1 ex. Mt. Sanbe, Shimane-ken. 26-III-1976. S. CHINONE. From litter under grove of *Larix leptolepis*.

**Measurements:** (in  $\mu\text{m}$ ,  $n=5$ ): Body length 173-235 (av. 211), width 110-120 (av. 116). Length of setae: *le* 16, *c* 21, *lm* 24, *lp* 22.

**Prodorsum:** Rostrum protruding, bilaterally followed by 1 large pointed tooth. Tectopodial fields rather small,

well defined, closed at anterior end. Lamellar knob large, semicircular in shape (often looks like a horseshoe). Seta *le* moderately long, about as long as seta *in*. Median notogastral condyles (*co.pm*) small or often reduced. The surface of prodorsum densely granulated except tectopodial fields; the area between rostrum and lamellar knob with somewhat large granules. Sensillus has a long slender head, pointed at tip sharply, beset with about 19 bristles in a row at equal intervals.

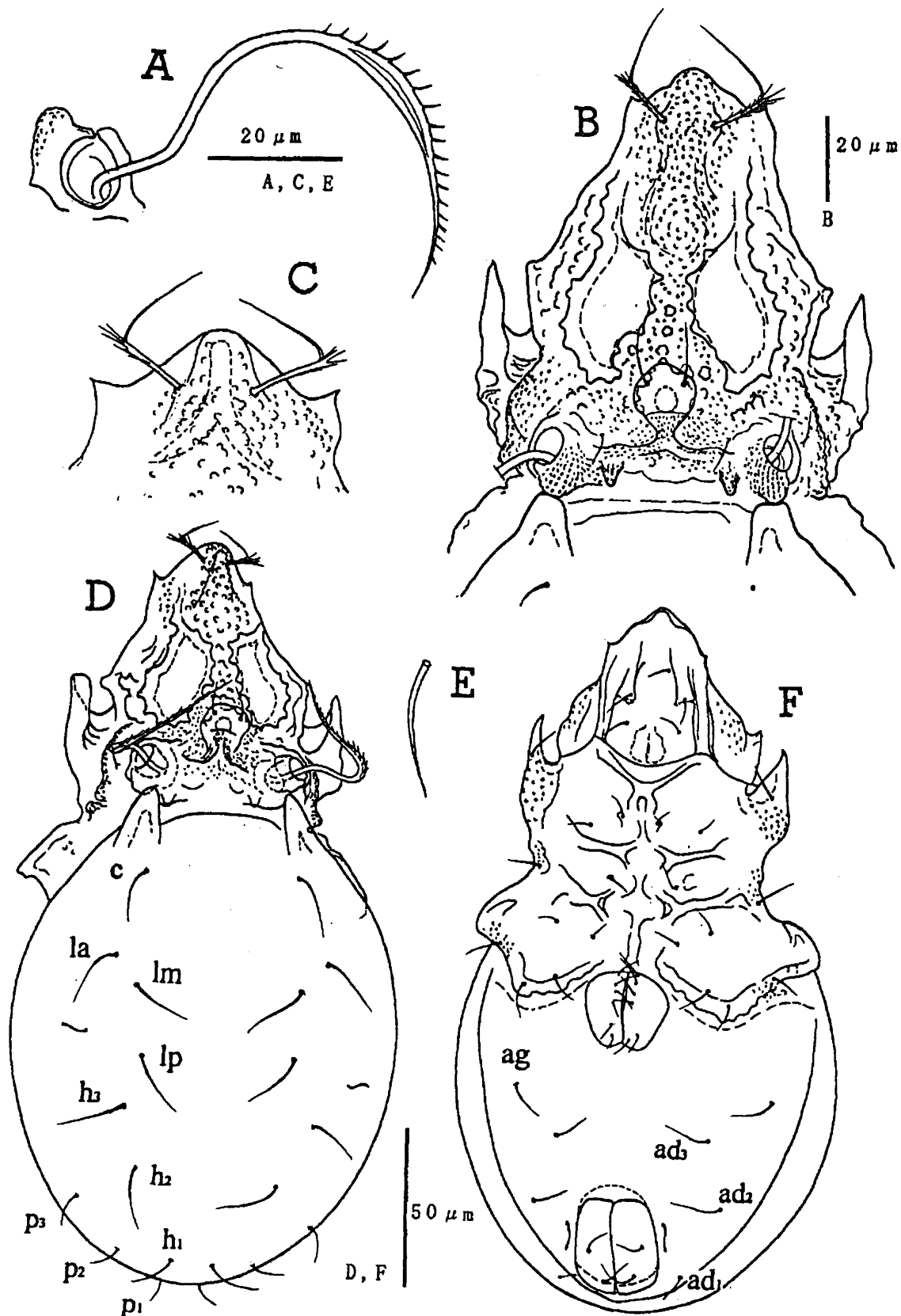


Fig.18: *Novosuctobelba monodentis* sp. n. --- A: Sensillus. B: Prodorsum in dorsal view. C: Rostrum. D: Dorsal aspect. E: Notogastral seta. F: Ventral aspect.

**Notogaster:** One pair of large lateral condyle (*co.nl*) presents on the anterior margin of notogaster. Ten pairs of notogastral setae. The setae setiform, medium long, curved at basal portion. Seta *la* located nearer to *lm* than *c*. One pair of lyrifissure (*im*) observed at the level of seta *ms*. *RLN* of notogastral setae: *lm* 19, *lp* 18.

**Ventral aspect:** It seems to have 6 pairs of genital setae; one palatype has 5 setae in the light genital plate, but 6 setae in the left genital plate. Setal formula of epimerata: 3-1-3-3. Relative length of setal intervals:  $ag-ag > ad_2-ad_2 \geq ad_3-ad_3 = ad_1-ad_1$ . The ratio of length to intervals:  $ag/ag-ag$  0.2,  $ad_3/ad_3-ad_3$  0.3.

**Remarks:** The new species is well characterized by having only 1 pair of large pointed rostral teeth, a long slender sensillar head with about 19 bristles in a low at equal intervals. On these characters, it may be distinguished from its congeners.

*Novosuctobelba latirostrata* sp. n.

[Hirozu-kataharimadodani]

(Fig.19)

**Material examined:** Holotype (NSMT-Ac 11332), Mt. Sanbe, Shimane-ken, 26-III-1972. S. CHINONE. From litter under grove of *Larix leptolepis*. --- 1 paratype (NSMT-Ac 11333): the same data as the holotype.

**Measurements:** (in  $\mu\text{m}$ ,  $n=2$ ): Body length 212-220, width 115-127, L/W 1.8. Length of setae: *le* 19, *c* 21, *lm* 23, *lp* 22.

**Prodorsum:** Setae *ro* bent like a knee. Rostrum rounded, with some granules at the tip. In ventral view 2 rostral teeth present: 1st one short triangular, 2nd one large and sharp, between them found a deep incision. Tectopedial fields widely opened anterior. Lamellar knob triangular with long setae *le*. Setae in short, slightly curved at distal end. Head of sensillus long and slender, pointed at tip, with about 10 long thin bristles at outside edge in a low.

**Notogaster:** One pair of condyles (*co.nl*) on the shoulders of notogaster. Between *co.nl* dorsosejugal suture straight. Ten pairs of notogastral setae. The setae moderately long and smooth, curved at basal portion gently. Seta *c* situated at base of *co.nl*, seta *la* at a level anterior to seta *lm*. Lyrifissure *im* found at a level between setae *lp* and *h*<sub>3</sub>. *RLN* of setae: *lm* 16, *lp* 15.

**Ventral aspect:** Six pairs of genital setae: *g*<sub>1</sub> long, about 2× as long as the remaining setae. Relative length of

setal intervals:  $ag-ag > ad_2-ad_2 > ad_1-ad_1 > ad_3-ad_3$ . Seta *ad*<sub>1</sub> inserted at a level to seta *an*<sub>1</sub>. *Iad* aligned at a level anterior to seta *an*<sub>2</sub>. Anal plate about 1.2× as long as genital plate.

**Remarks:** The new species is easily discriminated from its congeners by having the roundish rostrum, widely opened tectopedial field and a long slender pectinate sensillar head.

**Genus *Kuklosuctobelba* gen. n.**

[Meganemadodani- zoku]

Type species: *Kuklosuctobelba perbella* sp. n.

**Diagnosis:** Ten pairs of notogastral setae. Tectopedial fields small but well defined, rather circular or diamond-shaped. Two pairs of notogastral condyles (*co.nl* and *co.nm*) present: usually the lateral one (*co.nl*.) well developed. Rostral setae bent like a knee. Sensillus has a flat semilunar head with bristles on the outer edge. Lamellar knob often divided into two parts. Six pairs of genital setae.

**Etymology:** The generic name is derived from the circular shape of tectopedial field. The word "kuklo" originates from "kuklos" of Greek and it means "circle".

**Distribution:** Japan.

**Key to the Japanese species of the genus *Kuklosuctobelba***

- 1(4) Rostrum with teeth ----- 2
- 2(3) Rostrum bilaterally with 2 pointed teeth. Sensillus has a semilunar head with many fine bristles on outer edge ----- *K. perbella* sp.n.
- 3(2) Rostrum bilaterally with 3 teeth and one deep incision. Sensillus has a semilunar head with slender pointed tip and beset with about 9 bristles on outer edge ----- *K. yamizoensis* sp.n.
- 4(1) Rostrum without teeth. Notogastral setae winding. Notogaster rather long and slender ---- *K. tenuis* sp.n.

***Kuklosuctobelba perbella* sp. n.**

[Meganemadodani]

(Fig.20)

**Material examined:** Holotype (NSMT-Ac 11334), Mt. Yamizo, Ibaraki-ken. 28-IX-1981. S. CHINONE. From litter material taken in the forest of *Fagus crenata* and *Quercus mongolica grosseserrata*.---1 palatype(NSMT-Ac

11335): Mt. Kiyosumi, Chiba-ken. 18-XII-1983. S. CHINONE. From litter under grove of *Abies firma*. --- 3 paratypes (NSMT-Ac 11336 to 11338): Mt. Hanakame, Ibaraki-ken, 23-VIII-1984. S. CHINONE. From litter under grove of *Fagus crenata* and *Abies firma*.---1 ex. Shirakami Mountainous District, Fujisato-machi, Akita-ken. 27-VIII-1994. From litter under forest of *Fagus crenata* and *Pterocarya rhonifolia*.--- 1 ex. The Bunao Pass, Toyama-ken. 6-X-1996. Y. HIRAUCHI. From litter under forest of *Fagus crenata*.--- 1 ex. Mt. Setokura, Toyama-ken. 21-X-1997. Y. HIRAUCHI. From litter under forest of *Fagus crenata*.--- 1 ex. Hirasawa, Uotsu-shi, Toyama-ken. 12-IV-1998. Y. HIRAUCHI. From litter under grove of *Aesculus turbinata*.--- 2 ex. Bijodaira, Toyama-ken. 10-V-1998. From litter under forest of *Fagus crenata*.---1 ex. Mt. Hiei, Kyoto-fu. 25-IV-1973. S. CHINONE. From litter under forest of *Cryptomeria japonica*.--- 2 ex. Uenohara-machi, Kokubu-shi. Kagoshima-ken. 30-III-1990. H. SAKAYORI & K. ISHII. From litter under laurel forest.

**Measurements:** (in  $\mu\text{m}$ ,  $n=4$ ): Body length 190-213 (av.201), width 100-125 (114), L/W 1.8. Length of setae : *le* 12, *c* 19, *lm* 18, *lp* 19.

**Prodorsum:** Rostrum somewhat bridge-like, smooth, bilaterally with two pointed teeth. Tectopedial fields compact, rather circular in shape. Lamellar knob often separated into 2 parts. Between tectopedial fields and before lamellar knob scattered many large tubercles. Seta *le* moderately long, about 2 $\times$  as long as seta *in*. Head of sensillus semilunar with many fine bristles on outer edge.

**Notogaster:** Two pairs of notogastral condyles developed: *co.nl* rounded at tip, continuing backwards at the level of *lm*; *co.nm* thick and rather triangular in shape. Ten pairs of notogastral setae. The setae moderately long, curved at basal portion and slightly sinuate: setae *c*, *lm*, *la*, *lp* and *h*<sub>3</sub> slightly barbed, with about 2 short cilia distally: setae *h*<sub>1</sub>, *p*<sub>1</sub>, *p*<sub>2</sub> and *p*<sub>3</sub> are smooth. Seta *la* inserted nearer to *lm* than to *c*. The distance of *c-la* about 2.5 $\times$  as long as *la-lm*. Lyrifissure *im* situated in the level to seta *lp*. RLN of notogastral setae: *lm* 13, *lp* 14.

**Ventral aspect:** Six pairs of genital setae, about equal in length one another. Anal plate about 1.2 $\times$  as long as genital plate. Setal formula of epimerata: 3-1-3-3. Relative length of setal intervals:  $ag-ag=ad_2-ad_2>ad_3-ad_3>ad_1-ad_1$ , ratio of length to intervals:  $ag/ag-ag$  0.3,  $ad_3/ad_3-ad_3$  0.3.

**Remarks:** The new species is discriminated from its congeners by the following points: 1) the shape of rostrum (bilaterally with 2 pointed teeth), 2) sensillar head semilunar, and with many fine bristles on outer edge, 3) dorsal setae *c*, *lm*, *la*, *lp* and *h*<sub>3</sub> slightly barbed, with about 2 short cilia distally, while *h*<sub>1</sub>, *p*<sub>1</sub>, *p*<sub>2</sub> smooth.

*Kuklosuctobelba yamizoensis* sp. n.

[Yamizo-meganemadodani]

(Fig.21)

**Material examined:** Holotype (NSMT-Ac 11339), Mt. Yamizo, Ibaraki-ken. 28-IX-1981, S. CHINONE. From litter in the forest of *Fagus crenata* and *Quercus mongolica grosseserrata*. ---2 paratypes (NSMT-Ac 11340 and 11341): the same data as the holotype.

**Measurements:** (in  $\mu\text{m}$ ,  $n=3$ ): Body length 190-210 (av.198), width 110-125 (av.118), L/W 1.7. Length of setae : *le* 11, *c* 21, *lm* 28, *lp* 28.

**Prodorsum:** Apex of rostrum rounded gently, bilaterally concave weakly and with a short pointed tooth, followed by 1 deep incision and 2 large projecting teeth. Tectopedial field small and compact, well framed, somewhat diamond-shaped. Some large tubercles observed between tectopedial fields. Lamellar knob consisting of 2 parts. Sensillus has a semilunar head with slender pointed tip, with about 9 bristles on outer border. *Co.pm* small. Seta *le* medium long, about 2 $\times$  as long as seta *in*.

**Notogaster:** Lateral notogastral condyle (*co.nl*) prominently developed; granulated a little at tip and continuing backwards in the level of about seta *lm*. *Co.nm* rather small, continuing backwards about 1/3 $\times$  as long as *co.nl*, not reaching seta *c*. Ten pairs of notogastral setae: the setae medium long, curved at basal portion; setae *c*, *lm*, *la*, *lp*, *h*<sub>2</sub> and *h*<sub>3</sub> somewhat thick and barbed, beset about 5-6 cilia distally; setae *h*<sub>1</sub>, *p*<sub>1</sub> short and smooth. The seta *lm* inserted much nearer to *la*; distance *c-la* about 3 $\times$  as long as *la-lm*. RLN of length of setae: *lm* 22, *lp* 22.

**Ventral aspect:** Six pairs of genital setae: the anterior one much longer than the rest. Setal formula of epimerata: 3-1-3-3. Lateral area of epimera III and IV covered with many small granules. Anal plate about 1.2 $\times$  as long as genital plate. Relative length of setal intervals:  $ag-ag\geq ad_2-ad_2>ad_3-ad_3$ . The ratio of length to intervals:  $ag/ag-ag$  0.1,  $ad_3/ad_3-ad_3$  0.3.

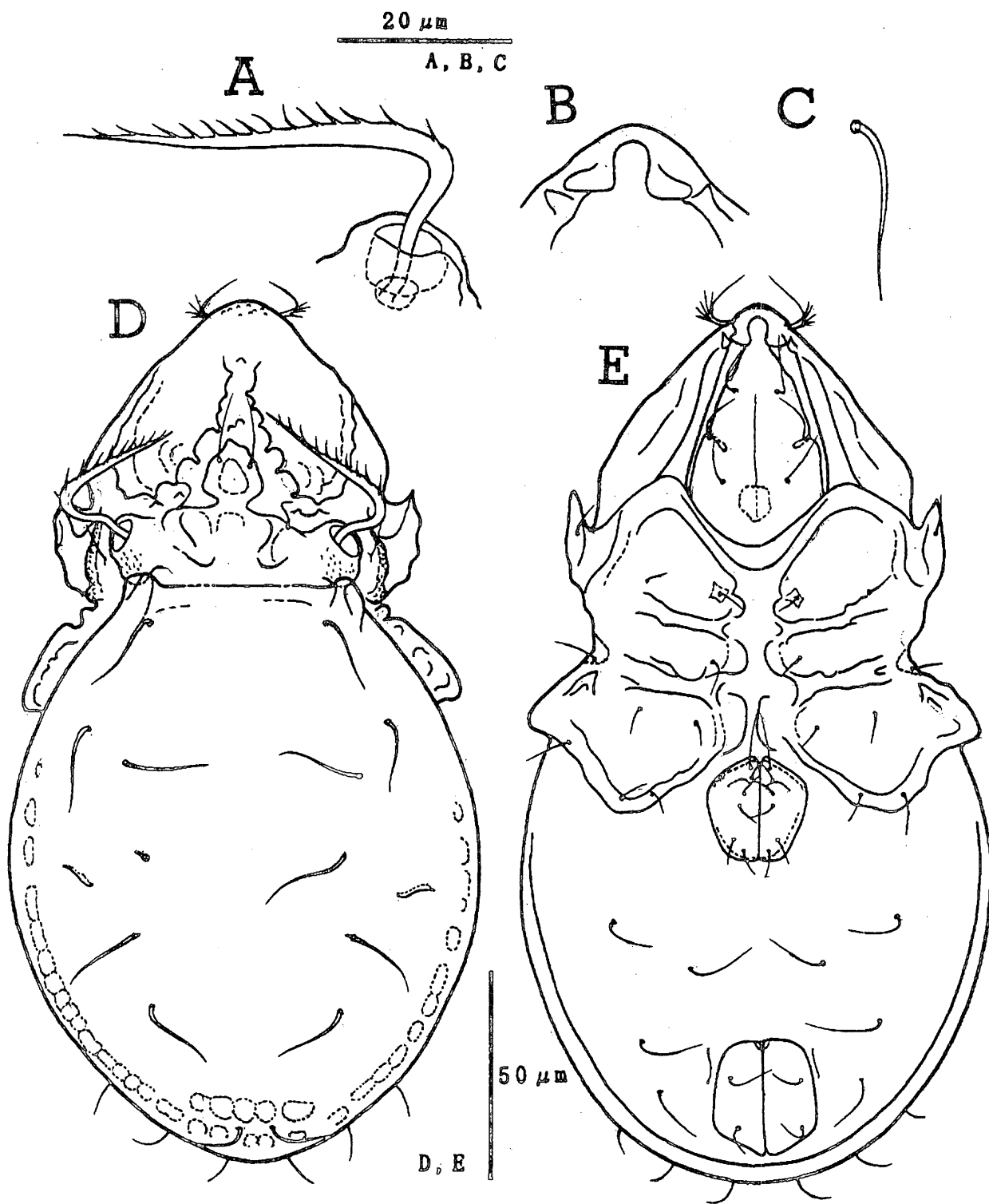


Fig.19: *Novosuctobelba latirostrata* sp. n.--- A: Sensillus. B: Rostral tip in ventral view. C: Notogastral seta. D: Dorsal aspect. E: Ventral aspect.

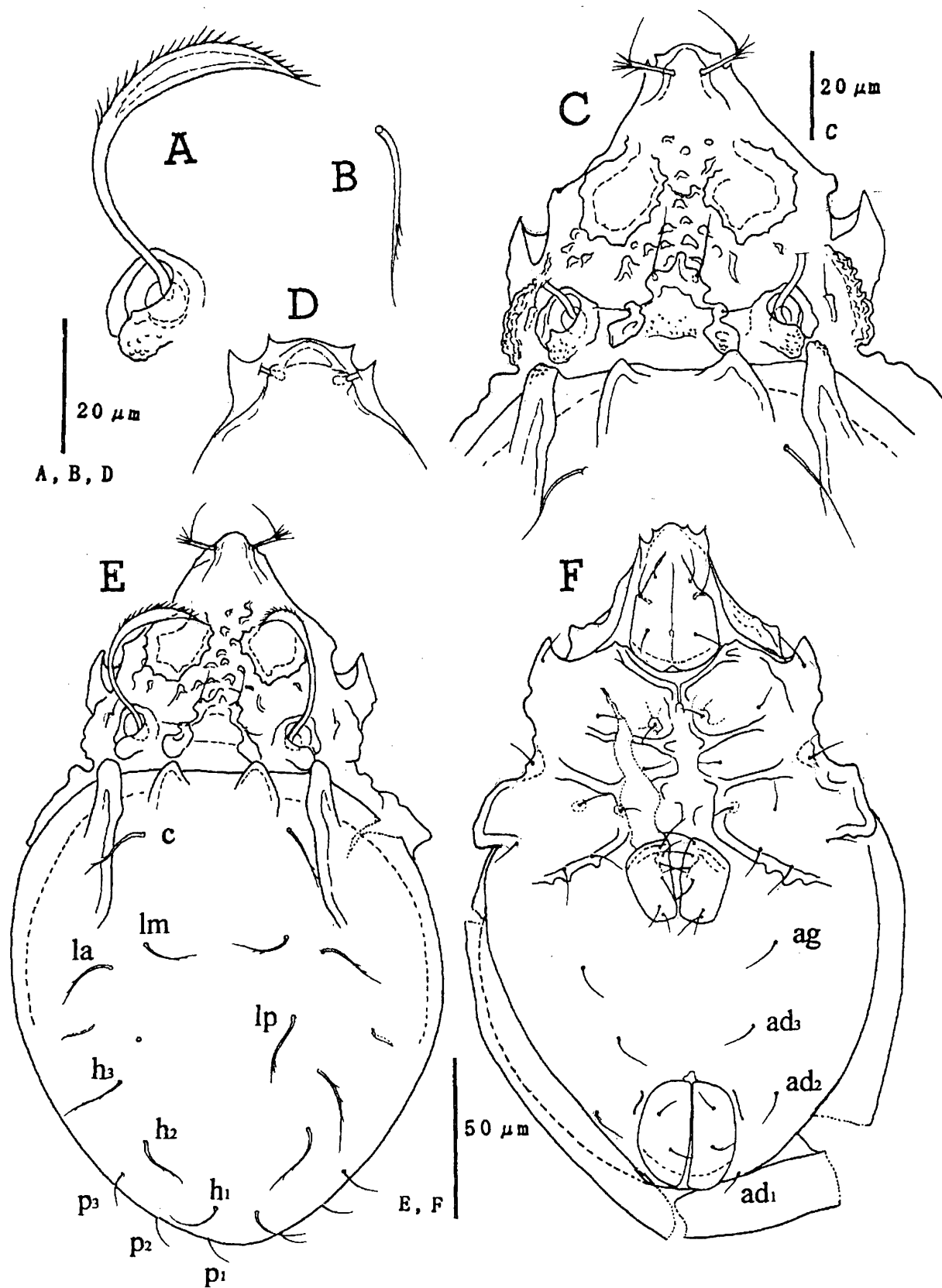


Fig.20: *Kuklosuctobelba perbella* sp. n.--- A: Sensillus. B: Notogastral seta. C: Prodorsum in dorsal view. D: Rostrum in dorsal view. E: Dorsal aspect. F: Ventral aspect.

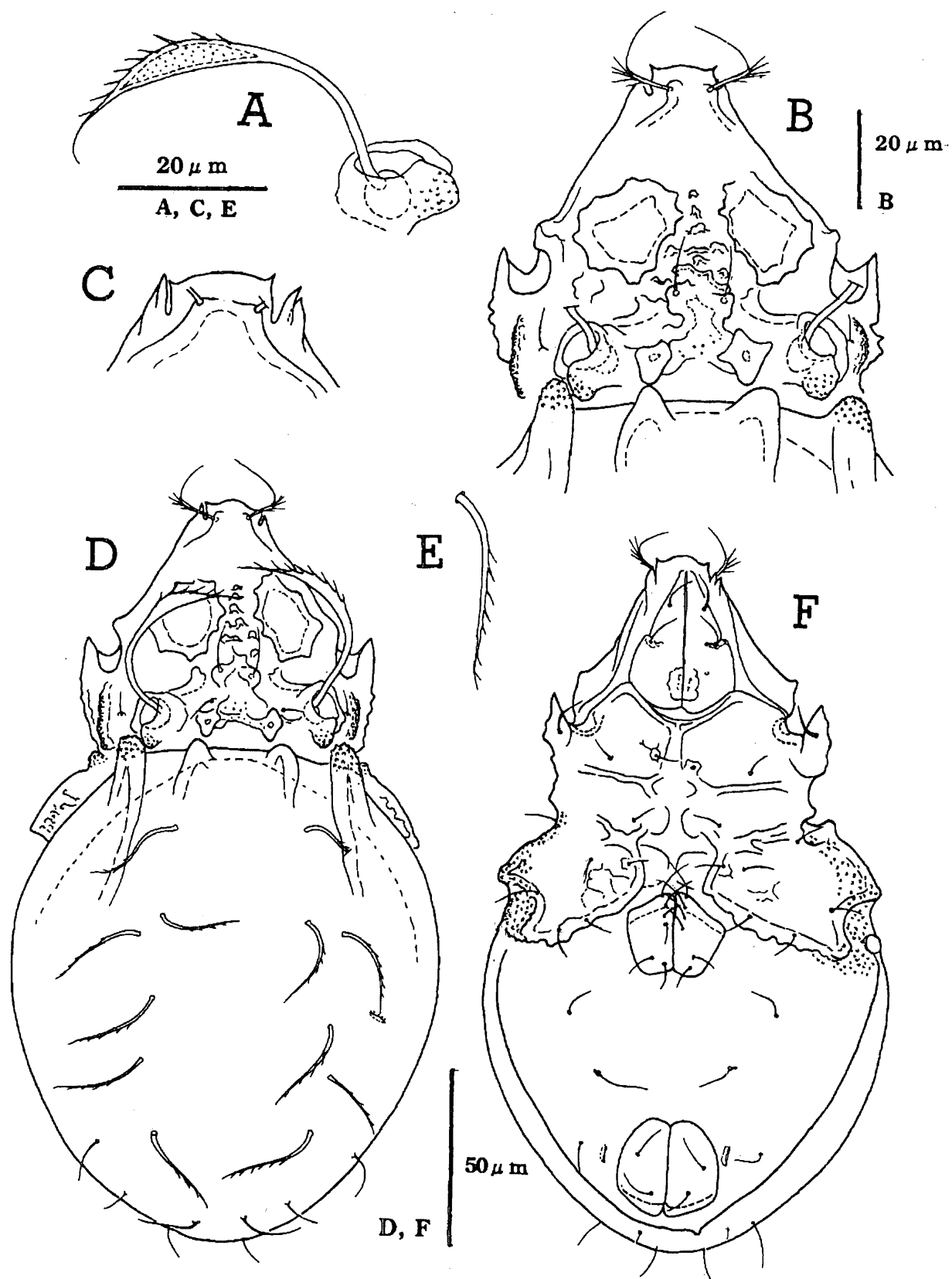


Fig.21: *Kuklosuctobelba yamizoensis* sp. n. --- A: Sensillus. B: Prodorsum in dorsal view. C: Rostral teeth. D: Dorsal aspect. E: Notogastral seta. F: Ventral aspect.

**Remarks:** The new species stands near to *Kuklosuctobelba perbella* sp. n., though it is distinguished from the latter by following characters: 1) a shape of rostral teeth: one short tooth and two projecting teeth with a deep incision between them, 2) sensillar head with about 9 fine bristles on outer border and a slender pointed tip, 3) dorsal setae barbed with about 5-6 cilia distally.

***Kuklosuctobelba tenuis* sp. n.**

[Hoso-meganemadodani]

(Fig.22)

**Material examined:** Holotype (NSMT-Ac 11342), Mt. Kiyosumi, Chiba-ken. 18-XII-1983. S. CHINONE. From litter under grove of *Abies firma*.

**Measurements:** (in  $\mu\text{m}$ ,  $n=1$ ): Body length 165, width 82. Length of setae: *le* 12, *c* 23, *lm* 26, *lp* 31.

**Prodorsum:** Rostrum smooth, with no teeth. Tectopedial fields compact, rather roundish in shape and connected each other by a short transverse ridge. Lamellar knob medially incised. In front of lamellar knob observed network pattern of ridges. Head of sensillus semilunar, with about 12 rather long bristles on outer border. *Co.pm* small and triangular in shape. Seta *le* about 2 $\times$  as long as seta *in*.

**Notogaster:** Notogaster rather long and slender, its length about 2 $\times$  as long as the width. Notogastral condyle *co.nl* projected, continuing backwards in the level of seta *lm*: *co.nm* has rounded tip and continuing backwards beyond the insertion of seta *c*. Ten pairs of notogastral setae. The setae moderately long, sinuate and barbed with about 8 short cilia, except for setae *p*<sub>1</sub>, *p*<sub>2</sub> and *p*<sub>3</sub> which are rather short and simple setiform. Distance of *c-lm* about 4 $\times$  as long as *la-lm*. Lyrifissure *im* situated near the end of *co.nl*. *RLN* of length to setae: *lm* 24, *lp* 28.

**Ventral aspect:** Six pairs of genital setae: the anterior most one much longer than the rest. Anal plate large, about 1.6 $\times$  as long as the genital plate. Setal formula of epimerata: 3-1-3-3. Relative length of setal intervals:  $ag-ag=ad_2-ad_2>ad_3-ad_3>ad_1-ad_1$ . The ratio of length to intervals:  $ag/ag-ag$  0.2,  $ad_3/ad_3-ad_3$  0.3.

**Remarks:** The new species can be distinguished from the similar two species, *Kuklosuctobelba perbella* and *K. yamizoensis*, by the following points: 1) notogaster elongate, its length 2 $\times$  as long as the width, 2) rostrum smooth, with no teeth, 3) main notogastral setae sinuate and barbed with about 12 rather long bristles on outer

border, 5) notogastral condyle *co.nl* projected, continuing backwards in the level of seta *lm*; *co.nm* with rounded tip, continuing backwards beyond the insertion of seta *c*.

**Genus *Niosuctobelba* gen. n.**

[Niomadodani-zoku]

Type species: *Niosuctobelba ruga* sp. n.

**Diagnosis:** Rostrum without lateral teeth. Rostral setae gently incurved with cilia on outside. Tectopedial field distinct and elongate, closing anteriorly. Lamellar knob present. Notogastral condyles well developed and keel-like; *co.nl* especially extending posteriorly beyond the insertion of setae *la*. Nine pairs of long dorsal setae; setae *c* inserted at the outside margin of *co.nm*. Six pairs of genital setae. The pattern of many stripes found on the dorsal and ventral surface.

**Etymology:** The generic name is derived from "Nio", the Deva King of Buddhism.

**Distribution:** Japan.

***Niosuctobelba ruga* sp. n.**

[Nio-madodani]

(Fig.23)

**Material examined:** Holotype (NSMT-Ac 11343), Tsuwano-cho, Shimane-ken, from litter under grove of *Pinus densiflora*. 28-III-1972. S. CHINONE. --- 2 paratypes (NSMT-Ac 11344 and 11345), the same data as the holotype.

**Measurements:** (in  $\mu\text{m}$ ,  $n=3$ ): Body length 240-268 (av. 255), width 142, L/W 1.9. Length of setae: *le* 26, *c* 43, *lm* 45, *lp* 62.

**Prodorsum:** Rostrum with bridge-like swelling, without teeth, following backwards to some irregular ridges. Seta *ro* incurved with short cilia on outside at basal half. Tectopedial field distinct, closed anteriorly. Lamellar knob irregular in shape, and elongate. Setae *le* about 3 $\times$  as long as mutual distance and about as long as setae *ro*. Sensillus with spindle-shaped head and rather long peduncle. Prodorsal condyles *co.pm* and *co.pl* present. Seta *in* short, as long as seta *ex*. Some tubercles found in front of lamellar knob. The greater part of surface densely granulated except for tectopedial fields.

**Notogaster:** Notogastral condyles keel-like and well developed; *co.nl* extending backwards beyond the base of setae *la*, *co.nm* half as long as *co.nl*. Nine pairs of dorsal setae: the setae long, smooth, gently curved at basal



portion; setae *c* inserted at the outside margin of *co.nm*; setae *lm* inserted closely to setae *la*. Notogastral surface around the base of setae *lm*, *la*, *lp*, *h<sub>2</sub>* and *h<sub>1</sub>* scattering many short stripes, arranging longitudinally. *RLN* of setae: *lm* 28. *lp* 37.

**Ventral aspect:** Six pairs of genital setae; *g<sub>1</sub>* slightly longer than the remaining setae. The setae of ano-genital plate rather long. Anal plate 1.4× as long as genital plate. In front of setae *an<sub>2</sub>*, anal plates with about 3 short stripes. A short *iad* found at a level somewhat anterior to setae *an<sub>2</sub>* and between setae *p<sub>1</sub>* and *p<sub>2</sub>*.

**Remarks:** The new species is easily separated from its congeners by the pattern of many stripes on the notogastral and ventral surface and the very long, well developed keel-like condyles of notogaster.

### Genus *Leptosuctobelba* gen. n.

[Nagamadodani-zoku]

Type species: *Leptosuctobelba vulgaris* sp. n.

**Diagnosis:** Body elongate. Rostral setae bent like a knee. Rostrum bridge-like, with about 4-5 teeth. The right and the left tectopedial fields sometimes fused into one field by reducing inner ridges. Sensillus has a long stalk and a fusiform or club-shaped head. Prodorsum densely granulated except for the tectopedial fields. *Co.nm* and *co.nm* closely situated, connected basally, so they seem to be one biapical condyle. Nine pairs of long notogastral setae. Six pairs of genital setae. *L. nondivia* (HAMMER, 1966) comb.n and *L. inenodabilis* (HAMMER, 1979) comb.n belong to this genus.

**Etymology:** The generic name is derived from the elongate body.

**Distribution:** Indonesia (Java), New Zealand, and Japan.

### Key to the Japanese species of the family *Leptosuctobelba*

- 1(2) Notogastral setae moderately long; seta *c* not reaching the insertion of seta *lm*. Inner ridge of tectopedial field shorter than outer one -----  
----- *L. vulgaris* sp.n.
- 2(3) Notogastral setae long; seta *c* reaching the insertion of seta *lm* ----- 3
- 3(4) Inner ridge of tectopedial field about equal to outer one. Sensillar head slender with a pointed tip

----- *L. lauta* sp.n.

- 4(3) The right and the left tectopedial fields fused into one field by reducing inner ridges. Notogastral setae thick and long ----- *L. monofenestella* sp.n.

### *Leptosuctobelba vulgaris* sp. n.

[Nami-nagamadodani]

(Fig.24)

**Material examined:** Holotype (NSMT-Ac 11346), Mt. Yamizo, Ibaraki-ken. 28-IX-1981, S. CHINONE. From litter under grove of *Quercus mongolica* var. *grosseserrata* and *Fagus crenata*. --- 2 paratypes (NSMT-Ac 11347-11348): the same data as the holotype. --- 1 ex. Mt. Hanakame, Ibaraki-ken. 23-VIII-1984, S. CHINONE. Litter under grove of *Fagus crenata* and *Abies firma*. --- 1 ex. Mt. Hanakame, 7-IX-1993, H. SAKAYORI. --- 1 ex. Tamada, Asahi-mura, Kashima-gun, Ibaraki-ken. 9-V-1979, S. CHINONE. From litter under grove of *Pinus densiflora*. --- 1 ex. Senjogahara, Nikko, Tochigi-ken. 24-V-1977, S. CHINONE. --- 3 exs. Teshikaga-cho, Hokkaido. 29-VII-1983, S. CHINONE. From litter under grove of *Betula ermani* and *Picea jezoensis*. --- 1 ex. Hidaka-cho, Hokkaido. 27-VII-1983, S. CHINONE. From litter under grove of *Quercus mongolica*. --- 4 exs. Matsukawa hot spring village, Matsuo-mura, Iwate-ken. 9-VIII-1973, S. CHINONE. From moss under grove of *Abies firma*. --- 1 ex. Mt. Adatara, Fukushima-ken. 30-VII-1985, S. CHINONE. From litter under grove of *Pinus pumila*. --- 6 exs. Tsuwano-cho, Shimane-ken, 28-III-1972, S. CHINONE; 3 exs. from litter under grove of *Pinus densiflora* and 3 exs. under *Cryptomeria japonica*. --- 1 ex. Kubokawa-machi, Kochi-ken. 23-X-1980, S. CHINONE. From litter under forest of *Castanopsis cuspidata* and *Cinnamomum camphora*. --- 1 ex. Oboke, Nishiiyama-mura, Tokushima-ken. 24-X-1980, S. CHINONE. From litter under forest of *Cryptomeria japonica*.

**Measurements:** (in  $\mu\text{m}$ ,  $n=5$ ): Body length 245-340 (av.297), width 115-170 (av.150). Length of setae (av.): *le* 17, *c* 32, *lm* 33, *lp* 30.

**Prodorsum:** Rostrum bridge-like with large tubercles. Apex of rostrum medially incised as U-shape and followed by 4 or 5 sharp teeth: 3rd tooth the longest. Tectopedial field elongate, inner ridges of which are shorter than the outer ridges: the former about 0.5× as long as the latter. Lamellar knob rather pentagonal in

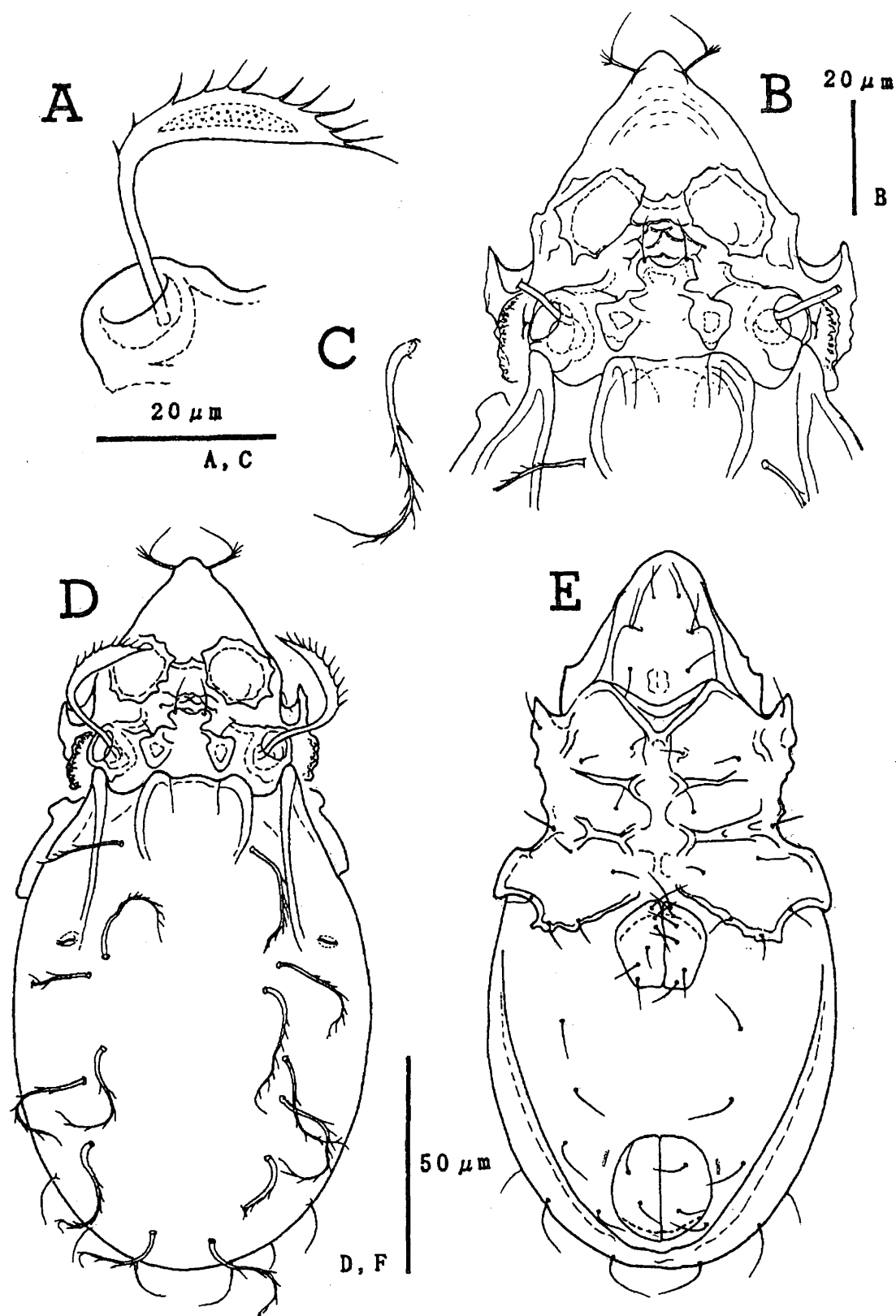


Fig.22: *Kuklosuctobelba tenuis* sp. n. --- A: Sensillus. B: Prodorsum in dorsal view. C: Notogastral seta. D: Dorsal aspect. E: Ventral aspect.

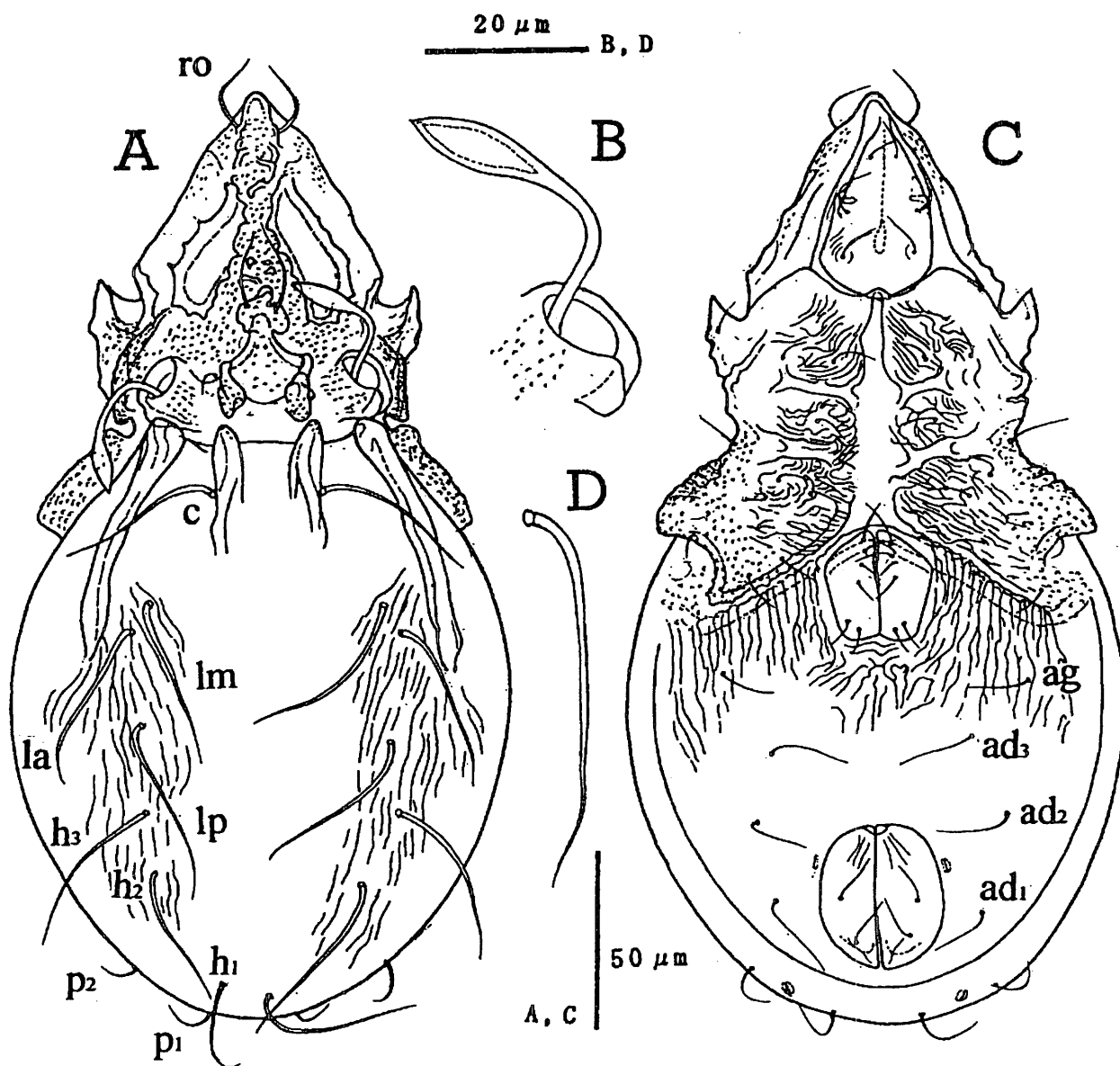


Fig.23: *Niosuctobelba ruga* sp. n. --- A: Dorsal aspect. B: Sensillus. C: Ventral view. D: Notogastral seta.

shape. Sensillus has a fine long stalk and a smooth, short fusiform head. Surface of prodorsum densely granulated except for the tectopedial fields; granules of the rostral area slightly larger than in the other area.

**Notogaster:** Notogaster rather elongate. Dorsosejugal suture not distinct. Notogastral condyle *co.nl* and *co.nm* closely situated, connected basally; *co.nl* short, beset with some granules at distal half; *co.nm* similar in shape to *co.nl* but not granulated. Nine pairs of notogastral setae.

The setae moderately long, smooth, rather fine, curved at basal portion. Seta *la* located nearer to *c* than to *lm*. Seta *c* not reaching the insertion of seta *lm*. Two pairs of lyrifissures observed: *ia* situated in front of seta *c* and *im* at the level between seta *lm* and *lp*. *RLN* of notogastral setae: *lm* 19, *lp* 18.

**Ventral aspect:** Six pairs of genital setae, about equal in length to one another. Anal plate large, about 1.3× as long as genital plate. Setal formula of epimerata: 3-1-3-3.

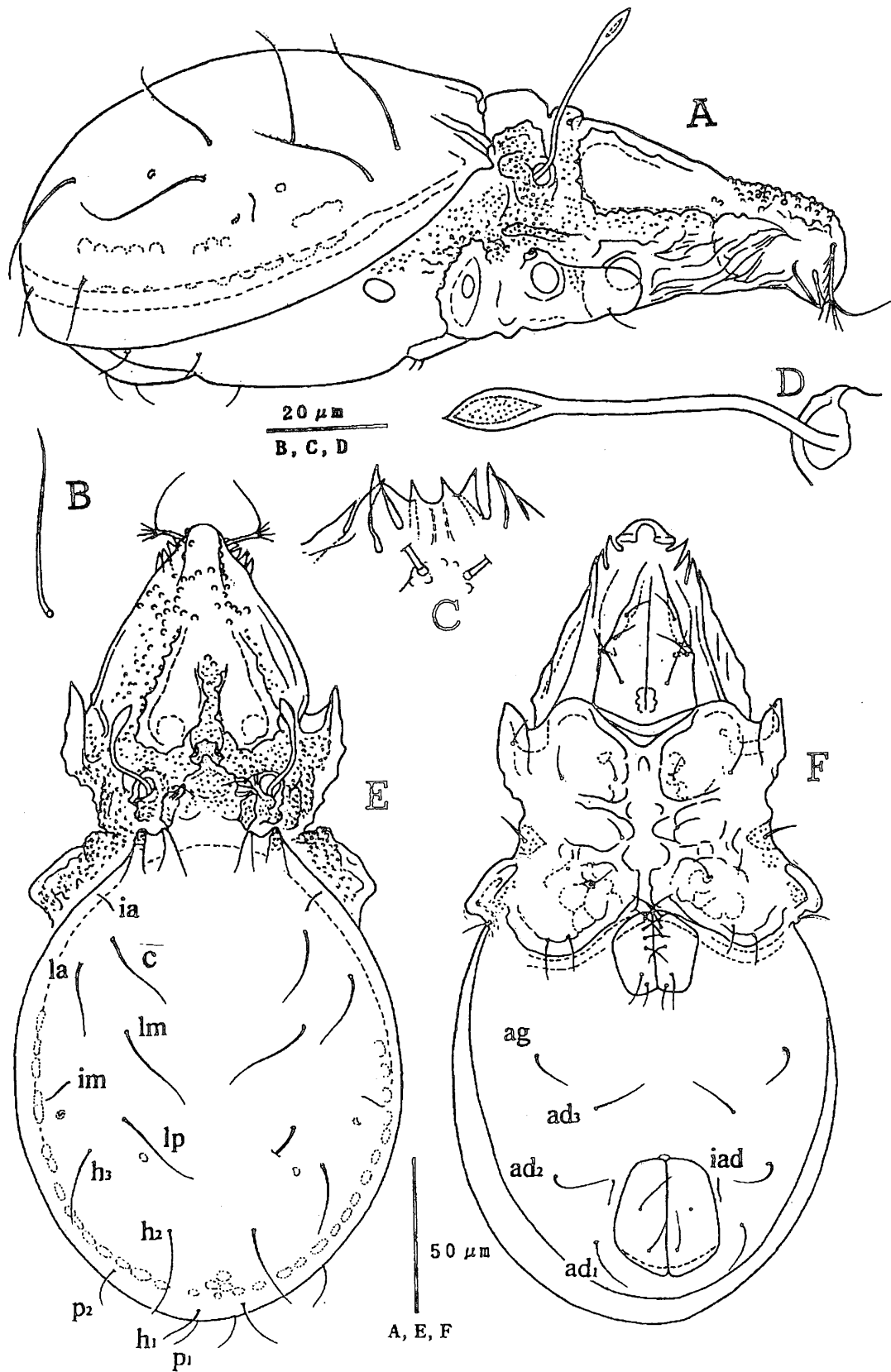


Fig.24: *Leptosuctobelba vulgaris* sp. n. --- A: Lateral aspect. B: Notogastral seta. C: Rostral teeth. D: Sensillus. E: Dorsal aspect. F: Ventral aspect.

Relative length of setal intervals:  $ag-ag > ad_2-ad_2 > ad_1-ad_1 = ad_3-ad_3$ . Seta  $ad_3$  located at the level between setae  $an_1$  and  $an_2$ .

**Remarks:** The new species is characterized by following points: 1) rostrum bilaterally with two sharp teeth projecting downward, and further with 3 or 4 sharp teeth, 2) inner ridge of tectopedial field shorter than outer one: the former about 0.5× as long as the latter, 3) notogastral setae moderately long, smooth: seta  $c$  not reaching the insertion of seta  $lm$ , 4) sensillar head short fusiform, with long stalk.

***Leptosuctobelba lauta* sp. n.**

[Hime-nagamadodani]

(Fig.25)

**Material examined:** Holotype (NSMT-Ac 11349); The Kashima Shrine, Ibaraki-ken. 28-II-1982. S. CHINONE. --- 2 paratypes (NSMT-Ac 11350 and 11351); Mt. Hanakame, Ibaraki-ken. 23-VIII-1984. S. CHINONE. --- 1 ex. Asahi-mura, Kashima-gun, Ibaraki-ken. 9-V-1979. From litter under grove of *Pinus thunbergii*. --- 1 ex. Enada, Usuki-shi, Oita-ken. 29-III-1990. T. USHIRODA & H. SAKAYORI. From litter under laurel forest and grove of *Fagus crenata*. ---1 ex. Oonuma Park, Shiobara-machi, Tochigi-ken. 13-XI-1994. Under grove of *Quercus mongolica grosseserrata*. --- 1 ex. Bijodaila, Toyama-ken. From litter under grove of *Fagus crenata*. Y. HIRAUCHI. ---1 ex. Katagai, Uotsu-shi, Toyama-ken. 12-IV-1998. Y. HIRAUCHI. From litter under grove of *Cryptomeria japonica*.

**Measurements:** (in  $\mu\text{m}$ ,  $n=4$ ): Body length 235-268 (av.253), width 123-130 (av. 126). Length of setae (av.):  $le$  14,  $c$  34,  $lm$  39,  $lp$  44.

**Prodorsum:** Rostrum bridge-like, but in ventral view it incised medially. About 4 rostral teeth present bilaterally: 1st tooth roundish lobe-like, 2nd one large and acute, 3rd one acute and 4th one short and acute. Tectopedial field narrow, inner ridge thin, but nearly as long as the outer ridge. Lamellar knob rather triangular. Sensillus has a fine long stalk and a small, smooth, long fusiform head: the stalk about 2.6× as long as the head. Surface of prodorsum densely granulated except for tectopedial fields: granules of rostral area slightly large.

**Notogaster:** Dorsosejugal suture not distinct. Notogastral condyle  $co.nl$  and  $co.nm$  closely situated, connected basally. Nine pairs of notogastral setae: the

setae long setiform, smooth, curved at basal portion, seta  $la$  located closely to  $c$ , seta  $c$  reaching the insertion of seta  $lm$ . Two pairs of lyrifissures observed:  $ia$  near to  $co.nl$  and  $im$  at the level of seta  $lp$ . *RLN* of setae:  $lm$  27,  $lp$  30.

**Ventral aspect:** Six pairs of genital setae. Setal formula of epimerata: 3-1-3-3. Anal plate large, about 1.5× as long as genital plate. Relative length of setal intervals:  $ag-ag > ad_2-ad_2 > ad_3-ad_3 = ad_1-ad_1$ .

**Remarks:** The new species stands near to *Leptosuctobelba vulgaris* sp. n. and *L. paracutidens* (MAHUNKA, 1983), n. comb., however, is distinguished from these species by the following points: 1) the shape of sensillus; long stalk and slender, smooth fusiform head with pointed tip, 2) the tectopedial fields narrower; their inner ridge thin but nearly as long as the outer ridge, 3) notogastral setae are long and smooth; seta  $c$  reaching the insertion of seta  $lm$ .

***Leptosuctobelba monofenestella* sp. n.**

[Hiro-nagamadodani]

(Fig.26)

**Material examined:** Holotype (NSMT-Ac 11352); the Kirishima Shrine, Kirishima-cho, Kagoshima-ken. 31-III-1990. K. ISHII & H. SAKAYORI. From litter under grove of *Castanopsis acuta*. --- 5 paratypes (NSMT-Ac 11353-11357): the same data as the holotype. ---1 ex. Nakanoshima Isl., Kagoshima-ken, 15-III-1987. J. AOKI. --- 1 ex. Tsuwano-cho, Shimane-ken. 28-III-1972. S. CHINONE. From litter under grove of *Pinus densiflora*.

**Measurements:** (in  $\mu\text{m}$ ,  $n=4$ ): Body length 270-313 (av.293), width 140-160 (av.149). Length of setae (av.):  $le$  19,  $c$  51,  $lm$  64,  $lp$  74.

**Prodorsum:** Rostrum bridge-like, its surface smooth. About 4 rostral teeth observed bilaterally: 1st tooth short, 2nd one thick and longest, 3rd and 4th ones thick and short; their tips sharply pointed. The right and the left tectopedial fields fused into one field by reducing inner ridges. Lamellar knob rather trapezoid. Sensillus has a rather thick and long stalk and a small fusiform head with a few fine bristles at tip: the stalk about 2.2× as long as the head. Surface of prodorsum densely granulated except for tectopedial fields and rostral area.

**Notogaster:**  $Co.nm$  and  $co.nl$  closely situated, connected with each other by a short transverse ridge;  $co.nm$  smooth and blunt at tip,  $co.nl$  slightly granulated and pointed at tip. Nine pairs of notogastral setae.

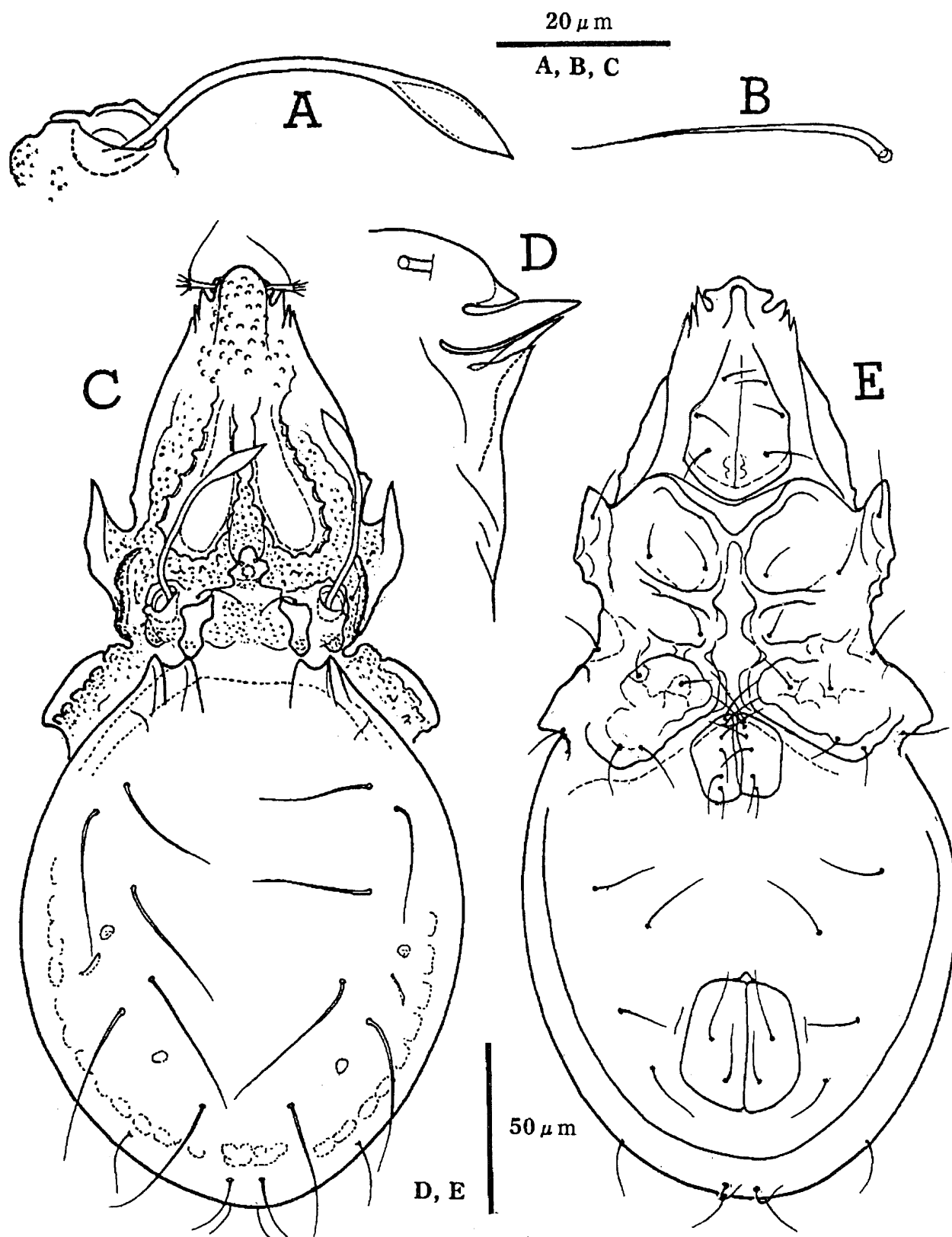


Fig.25: *Leptosuctobelba lauta* sp. n. ---A: Sensillus. B: Notogastral seta C: Rostral teeth in lateral view. D: Dorsal aspect. E: Ventral aspect.

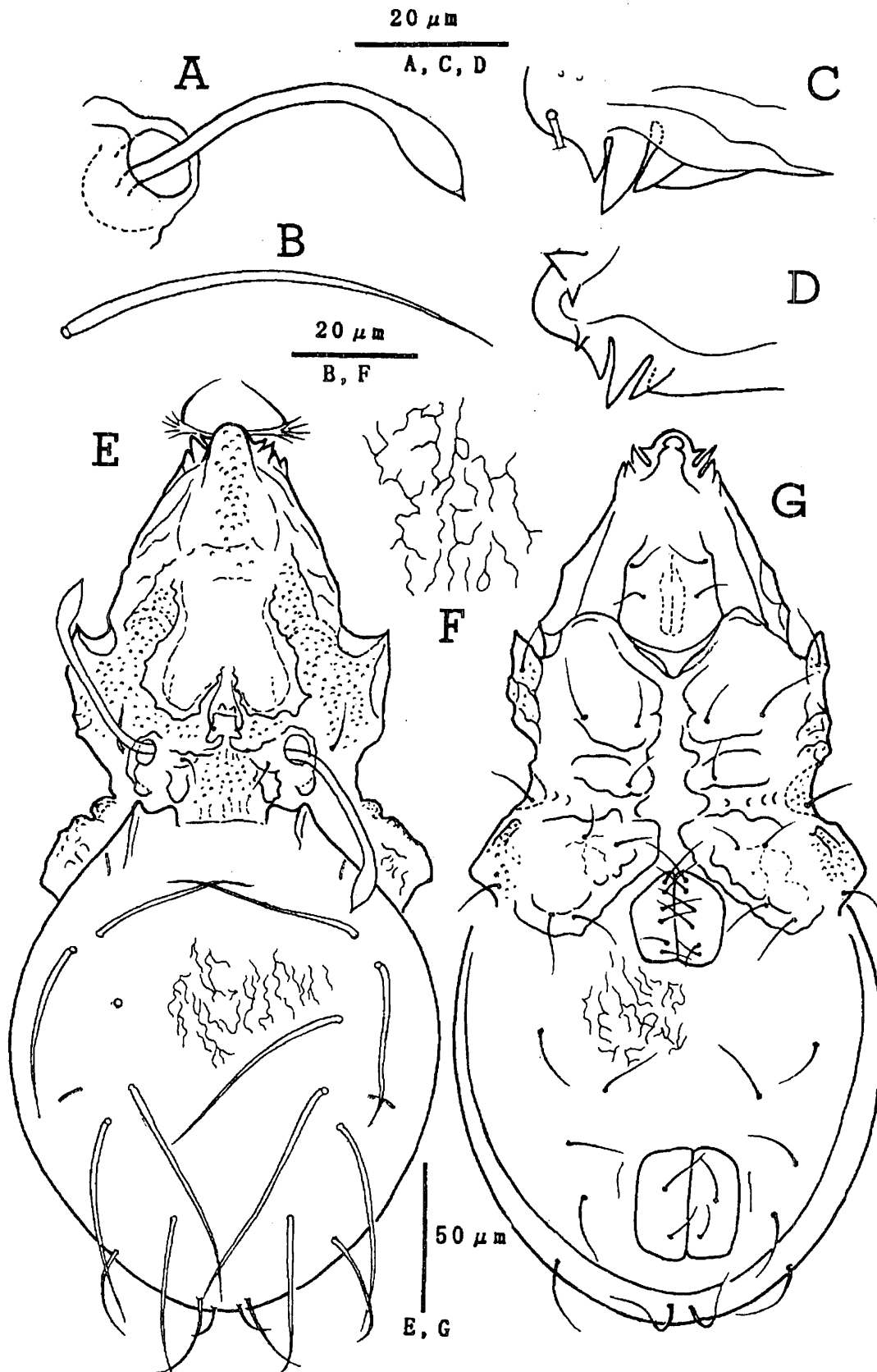


Fig.26: *Leptosuctobelba monofenestella* sp. n.--- A: Sensillus. B: Notogastral seta. C: Rostral teeth in laterodorsal view. D: Rostral teeth in ventral view. E: Dorsal aspect. F: Pattern on dorsal surface of notogaster. G: Ventral aspect.

The setae setiform, thick and long, curved at basal portion, rather sinuate at tip except for  $p_1$ : seta  $c$  reaching beyond the insertion of seta  $lp$ , seta  $la$  located nearer to  $c$  than to  $lm$ , seta  $p_1$  short and curved downwards. Two pairs of lyrifissures observed:  $ia$  situated longitudinally outside  $co.nl$ .  $RLN$  of setae:  $lm$  37,  $lp$  43. Surface of notogaster sculptured usually with fine irregular striae.

**Ventral aspect:** Six pairs of genital setae, about equal in length to one another. Epimeral setae rather long, about equal in length to seta  $ag$ . Setal formula of epimerata: 3-1-3-3. Anal plate large, about 1.3× as long as genital plate. Decidium on epimeral plate IV rather well developed, pointed at tip, directed anteroinwards. The surface near decidium densely granulated. Ventral surface of anogenital region striated.

**Remarks:** The new species stands near *L. transitoria* (BALOGH et MAHUNKA, 1974) comb.n., but discriminated from the latter by the following points: 1) the tectopedial fields fused incompletely and heart-shaped; in the latter species the fields completely fused into one, ellipse-shaped and wide, 2) the shape of rostral area, 3) the pattern of notogastral surface with fine irregular striae. 4) notogastral seta  $c$  reaching beyond the insertion of seta  $lp$ .

#### Genus *Suctobelbella* JACOT, 1937

[Togemadodani- zoku]

*Suctobelbella* JACOT, 1937.

*Discosuctobelba* HAMMER, 1979. syn.n.

*Flagrosuctobelba* HAMMER, 1979. syn.n.

Type species: *Suctobelbella serratirostrum* JACOT, 1937.

**Diagnosis:** Usually, 9 pairs of notogastral setae; only one species from Japan has 8 pairs. On the anterior margin of notogaster usually present two pairs of developed condyles ( $co.nm$  and  $co.nl$ ). Rostral setae bent like a knee. Rostrum usually has teeth on antero-lateral margin. Tectopedial field and lamellar knob comparatively developed. Head of sensillus shows various types in shape. Usually one pairs of lyrifissure ( $ia$ ) present on notogastral surface. Number of genital setae presenting three types: 6 pairs, 5 pairs and 4 pairs. Setal formula of epimerata: 3-1-3-3. The *Suctobelbella* species of Japan are classified according to the number of genital setae as shown below.

**Distribution:** Cosmopolitan.

6 pairs of genital setae . . . . Type A

5 pairs of genital setae . . . . Type B

4 pairs of genital setae . . . . Type C

#### Type A ( 6 pairs of genital setae )

#### Key to the Japanese species of the type A in the genus *Suctobelbella*

- 1(32) Head of sensillus slender, semilunar in shape and ciliate ----- 2
- 2(15) Dorsal setae short,  $RLN$  of seta:  $lp$  7-14 ----- 3
- 3(10) Rostrum with 2 or 3 teeth ----- 4
- 4(7) Tectopedial field closing or being narrow anteriad.  
Upper surface of rostrum usually with many granules  
----- 5
- 5(6) Rostrum with rounded tip. Notogastral setae glabrous ----- *S. naginata* (AOKI, 1961)
- 6(5) Rostrum medially incised. Main notogastral setae thick and barbed ----- *S. kantoensis* sp.n.
- 7(4) Tectopedial field widely opened anteriad----- 8
- 8(9) Rostrum with rounded and smooth tip ----- *S. lata* sp.n.
- 9(8) Rostrum with pointed tip ----- *S. acuta* sp.n.
- 10(3) Rostrum with 5-6 teeth ----- 11
- 11(12) Head of sensillus with long slender tip -----  
----- *S. solita* sp.n.
- 12(11) Head of sensillus crescent-shaped or spindle-shaped with rather short tip ----- 13
- 13(14) A large epimeral cavity  $cav$  present. Sensillus with crescent-shaped head ----- *S. latipectoralis* sp.n.
- 14(13) Epimeral cavity  $cav$  not developed. Sensillus with spindle-shaped head ----- *S. hokkaidoensis* sp.n.
- 15(2) Dorsal setae long,  $RLN$  of seta:  $lp$  22-34 ----- 16
- 16(29) Dorsal setae not winding ----- 17
- 17(18) Epimeral cavity  $cav$  large ----- *S. magnicava* sp.n.
- 18(17) Epimeral cavity  $cav$  not developed or weakly developed ----- 19
- 19(24) Head of sensillus long and slender ----- 20
- 20(23) Dorsal seta  $lm$  not reaching the insertion of seta  $lp$   
----- 21
- 21(22) Dorsal setae feather-like, with 4-5 branches  
----- *S. tohokuensis* ENAMI et CHINONE, 1997
- 22(21) Dorsal setae slightly barbed, not feather-like  
----- *S. parva* sp.n.
- 23(20) Dorsal seta  $lm$  reaching seta  $lp$  ----- *S. aokii* sp.n.
- 24(19) Head of sensillus crescent-shaped, not so long and



- slender ----- 25
- 25(26) Body length is less than 200 $\mu$ m (av. 186 $\mu$ m) -----  
----- *S. subcornigera* (FORSSLUND, 1941)
- 26(25) Body length is more than 200 $\mu$ m (av. 258 $\mu$ m) -----  
----- 27
- 27(28) Granules of rostral surface many and large -----  
----- *S. granifera* sp. n.
- 28(27) Granules of rostral surface not so large as the  
former -- *S. nayloroensis* FUJITA et FUJIKAWA, 1987
- 29(16) Dorsal setae winding ----- 28
- 30(31) Rostrum like an anchor in shape by deep incisions  
of both side ----- *S. anchorhina* sp. n.
- 31(30) Rostrum not like an anchor in shape. Dorsal setae  
barbed at distal half ----- *S. flagellifera* sp. n.
- 32(1) Head of sensillus not semilunar in shape ----- 33
- 33(44) Rostrum with no tusk-like teeth ----- 34
- 34(39) Sensillus with spindle-shaped head ----- 35
- 35(36) Sensillar head with many short bristles on outer  
side and densely granulated ----- *S. crispirhina* sp. n.
- 36(35) Head of sensillus glabrous ----- 37
- 37(38) Rostral tip medially with a small incision like a  
letter U ----- *S. alpina* sp. n.
- 38(37) Rostral tip with no incision like a letter U.  
Epimeral cavity *cav* large -----  
----- *S. yezoensis* FUJITA et FUJIKAWA, 1987
- 39(34) Sensillar head clavate with many bristles ----- 40
- 40(41) Dorsal setae of notogaster well winding -----  
----- *S. spirochaeta* MAHUNKA, 1983
- 41(40) Dorsal setae of notogaster not winding ----- 42
- 42(43) Dorsal setae thick and barbed at distal half -----  
----- *S. variosetosa* (HAMMER, 1961)
- 43(42) Dorsal setae setiform and rostral surface with  
mesh-like patterns ----- *S. reticulata* sp. n.
- 44(33) Rostrum with tusk-like teeth. Epimeral cavity *cav*  
large ----- *S. longidentata* sp. n.

***Suctobelbella naginata* (AOKI, 1961)**

[*Naginata-madodani*]

(Fig.1)

*Suctobelba naginata* AOKI, 1961, p.66-67, Abb.4.

*Suctobelbella naginata*: AOKI, 1976, p.42.

**Material examined:** 7 exs. Ono-mura, Ibaraki-ken. 6-VII-1979. From litter under grove of *Pinus densiflora*. S. CHINONE. --- 2 exs. Kashima Shrine, Ibaraki-ken. From litter under forest of *Castanopsis cuspidata* and *Cryptomeria japonica*. 19-VIII-1981. S. CHINONE. --- 6

exs. Mt. Kaba, Ibaraki-ken. 27-VI-1986. S. CHINONE. From litter under forest of *Quercus acutissima* and *Q. serrata*. --- 1 ex. The Omotari Shrine, Toride-shi, Ibaraki-ken. 27-V-1970. S. CHINONE. From litter under grove of *Castanopsis cuspidata* and *Pinus densiflora*. --- 3 exs. Uematsu, Hazaki-machi, Ibaraki-ken. 6-VII-1979. S. CHINONE. From litter under grove of *Pinus thunbergii*. --- 8 exs. Pass Tenhoku, Nishiokkoppe-mura, Hokkaido. From litter under copse (maple tree and etc.). 30-VII-1983. S. CHINONE. --- 1 ex. Hidaka-cho, Hokkaido. 27-VII-1983. S. CHINONE. From litter under forest of *Quercus mongolica* and *Betula platyphylla japonica*. --- 1 ex. Near Lake Akanko, Hokkaido. 28-VII-1983. S. CHINONE. From litter under forest of *Q. mongolica* and *B. platyphylla*. --- 1 ex. Tomikawa, Monbetsu-cho, Hokkaido. 27-VII-1983. S. CHINONE. From litter under grove of *Q. mongolica grosseserrata*. --- 17 exs. Cave Ryusendo, Iwate-ken. 8-VIII-1973. S. CHINONE. From litter under grove of *Q. mongolica grosseserrata* and maple trees. --- 1 ex. Masaki, Taro-cho, Iwate-ken. 8-VIII-1973. S. CHINONE. From litter under grove of *Pinus densiflora*. --- 1 ex. The foot of Mt. Hayatine, Hiratudo, Kawai-mura, Iwate-ken. 7-VIII-1973. S. CHINONE. From litter under *Q. mongolica grosseserrata*, *Fagus crenata* and maple trees. --- 1 ex. Mt. Kiyosumi, Chiba-ken. 18-XII-1983. S. CHINONE. From litter under forest of *Cyclobalanopsis glauca*. --- 1 ex. Bijodaira, Toyamaken. 12-VII-1998. Y. HIRAUCHI. From litter under forest of *Fagus crenata*. --- 1 ex. Akiyoshidai, Yamaguchi-ken. 29-III-1972. S. CHINONE. From litter under grove of *Quercus acutissima*. --- 2 exs. Mt. Sanbe, Shimane-ken. 26-III-1972. S. CHINONE. From litter under grove of *Larix leptolepis*. --- 8 exs. The Matsuyama Castle, Matsuyama-shi, Ehime-ken. 19-X-1980. S. CHINONE. From litter under grove of oak trees. --- 6 exs. Yashima, Takamatsu-shi, Kagawa-ken. 24-X-1980. S. CHINONE. From litter under grove of *Cameria sasanqua* and *Castanopsis cuspidata*. --- 3 exs. Yahatahama-shi, Ehime-ken. 22-X-1980. S. CHINONE. From litter under grove of *Cinnamomum camphola*, *Prunus jamasakura* and oak tree. --- 1 ex. Oboke, Nishiiyayama-mura, Tokushima-ken. S. CHINONE. From litter under grove of *Cryptomeria japonica*. --- 1 ex. Tatsukushi, Tosashimizu-shi, Kochi-ken. 22-X-1980. S. CHINONE. From litter under grove of *C. camphola*, *Machilus thunbergii* and *Castanopsis cuspidata*. --- 1 ex. Ogura, Beppu-shi, Oita-ken. 29-III-1990. T. USHIRODA & H.

SAKAYORI. From litter under laurel forest. ---1 ex. Enada, Usuki-shi, Kagoshima-ken. 29-III-1990. T. USHIRODA & H. SAKAYORI. From litter under grove of *Cryptomeria japonica*.--- 1 ex. Kurakake, Uenohara-cho, Kokubu-shi, Kagoshima-ken. 30-III-1990. K. ISHII & H. SAKAYORI. From litter under laurel forest. ---1 ex. the Kirishima Shrine, Kirishima-machi, Kagoshima-ken. K. ISHII & H. SAKAYORI. 31-III-1990. From litter under grove of *Castanopsis acuta*. --- 3 exs. Tonan Botanical Garden, Okinawa-ken. S. CHINONE. 5-V-1974.

**Remarks:** This species is the most common suctobelbid mite in Japan. Original description (AOKI, 1961) indicates some diagnostic characters: 1) rostrum bridge-like, scattered many granules, 2) three rostral teeth with sharp pointed tip, 3) head of sensillus long and semilunar in shape, unilaterally ciliated. Judging from the original figures, following characters should be added: 1) notogastral setae short, 2) seta *c* inserted just behind *co.nm*.

**Distribution:** Russia (the Far Eastern Region) and Japan.

***Suctobelbella kantoensis* sp. n.**

[Kanto-madodani]

(Fig.27)

**Material examined:** Holotype (NSMT-Ac 11358); Mt. Yamizo, Ibaraki-ken. 28-IX-1981. S. CHINONE. From litter under forest of *Quercus mongolica grosseserrata* and *Fagus crenata*.---2 paratypes (NSMT-Ac 11359 and 11360); the same data as the holotype.---3 exs. Mt. Kiyosumi, Chiba-ken. 18-XII-1983. S. CHINONE. From litter under forest of *Abies firma*.

**Measurements:** (in  $\mu\text{m}$ ,  $n=5$ ): Body length 158-185 (av.168), width 85-115 (av.94), L/W 1.8. Length of setae: *le* 6, *c* 13, *lm* 16, *lp* 15.

**Prodorsum:** Rostrum at its apex almost straight and wide but slightly incised medially, with 1 large apical lobe bilaterally and 3 rostral teeth: 1st one thick triangular, 2nd one thick and acute, 3rd one short, thin and acute. Rostral area granulated; especially, some large granules found behind setae *ro*, followed by some other granules between tectopedial fields and around lamellar knob. Tectopedial fields elongate oval in shape. Lamellar knob large and roundish trapezoid in shape and well defined. Sensillus sickle-like with slender head, tapering to the tip; fine bristles arranged from upper part of stalk to the tip of

head on outer edge.

**Notogaster:** Notogaster oval in shape, about  $1.1\times$  as long as wide. Notogastral condyles well developed; *co.nm* triangular, *co.nl* long and slender, about  $2\times$  as long as *co.nm*. Nine pairs of notogastral setae short and curved gently: setae *la*, *lm*, *lp*, *h*<sub>2</sub> and *h*<sub>3</sub> rather thick and barbed at distal half; setae *c*, *h*<sub>1</sub>, *p*<sub>1</sub> and *p*<sub>2</sub> short and fine. *RLN* of setae: *lm* 15, *lp* 14.

**Ventral aspect:** Epimeral cavity not developed. Six pairs of genital setae; 1st pair much longer than the rest. Setal formula of epimerata: 3-1-3-3. Relative length of setal intervals:  $ag-ag > ad_2-ad_2 > ad_3-ad_3 = ad_1-ad_1$ . The ratio of length to intervals:  $ag/ag-ag$  0.1,  $ad_3/ad_3-ad_3$  0.3.

**Remarks:** The new species is discriminated from its congeners by (1) slender head of sensillus, tapering to the tip, with fine bristles from upper part of stalk to the tip of head, (2) rostrum bridge-like, its tip medially incised slightly, (3) well developed notogastral condyles; *co.nl* long and slender, about  $2\times$  as long as *co.nm*, (4) the shape of notogastral setae; setae short and thick, barbed at distal half.

***Suctobelbella lata* sp. n.**

[Madoaki-madodani]

(Fig.28)

**Material examined:** Holotype (NSMT-Ac 11361), the Kirishima Shrine, Kirishima-cho, Kagoshima-ken. 31-III-1990. K. ISHII & H. SAKAYORI. From litter under grove of *Castanopsis acuta* and bamboo grass. --- 2 paratypes (NSMT-Ac 11362 and 11363); the same data as the holotype. --- 4 exs. Bijodaira, Toyama-ken. 10-V-1995. Y. HIRAUCHI. From litter under grove of *Fagus crenata*. --- 1 ex. Oboke, Nishiiyayama-mura, Tokushima-ken. 24-X-1980. S. CHINONE. From litter under grove of *Cryptomeria japonica*.

**Measurements:** (in  $\mu\text{m}$ ,  $n=5$ ): Body length 192-205 (av.198), width 98-113 (av.103), L/W 1.9. Length of setae (av.): *le* 9, *c* 8, *lm* 8, *lp* 8.

**Prodorsum:** Rostrum rounded and smooth, but its apex only granulated. In front of tectopedial field, forehead of prodorsum well swollen and smooth. Three rostral teeth observed: 1st one curved downwards or inwards, being invisible from upside, 2nd one triangular in shape, 3rd one long and thick with pointed tip. Tectopedial field widely opened ahead. Lamellar knob roundish pentagonal in shape.

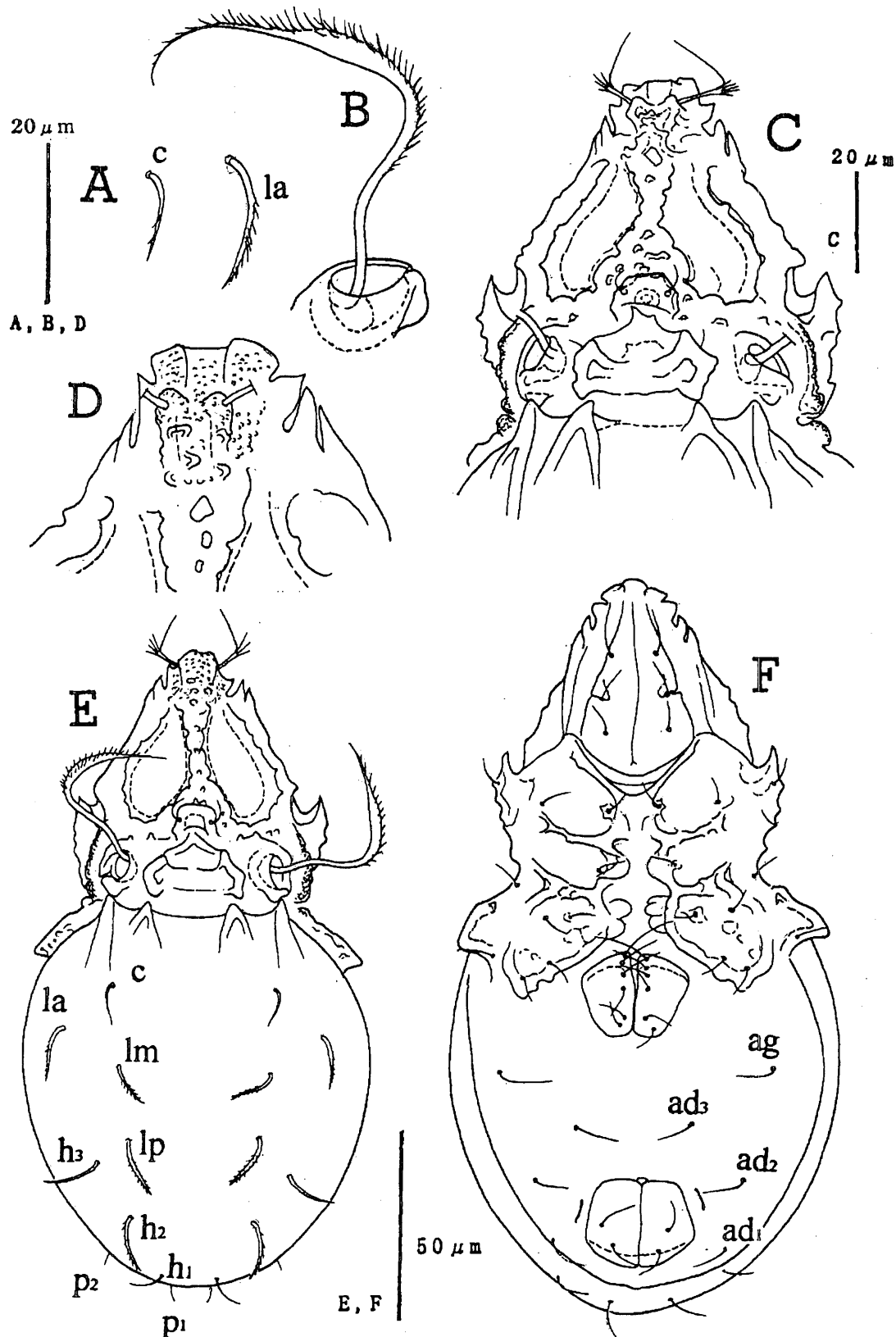


Fig.27: *Suctobelbella kantoensis* sp. n. --- A: Notogastral setae. B: Sensillus. C: Prodorsum in dorsal view. D: Rostrum in dorsal view. E: Dorsal aspect. F: Ventral aspect

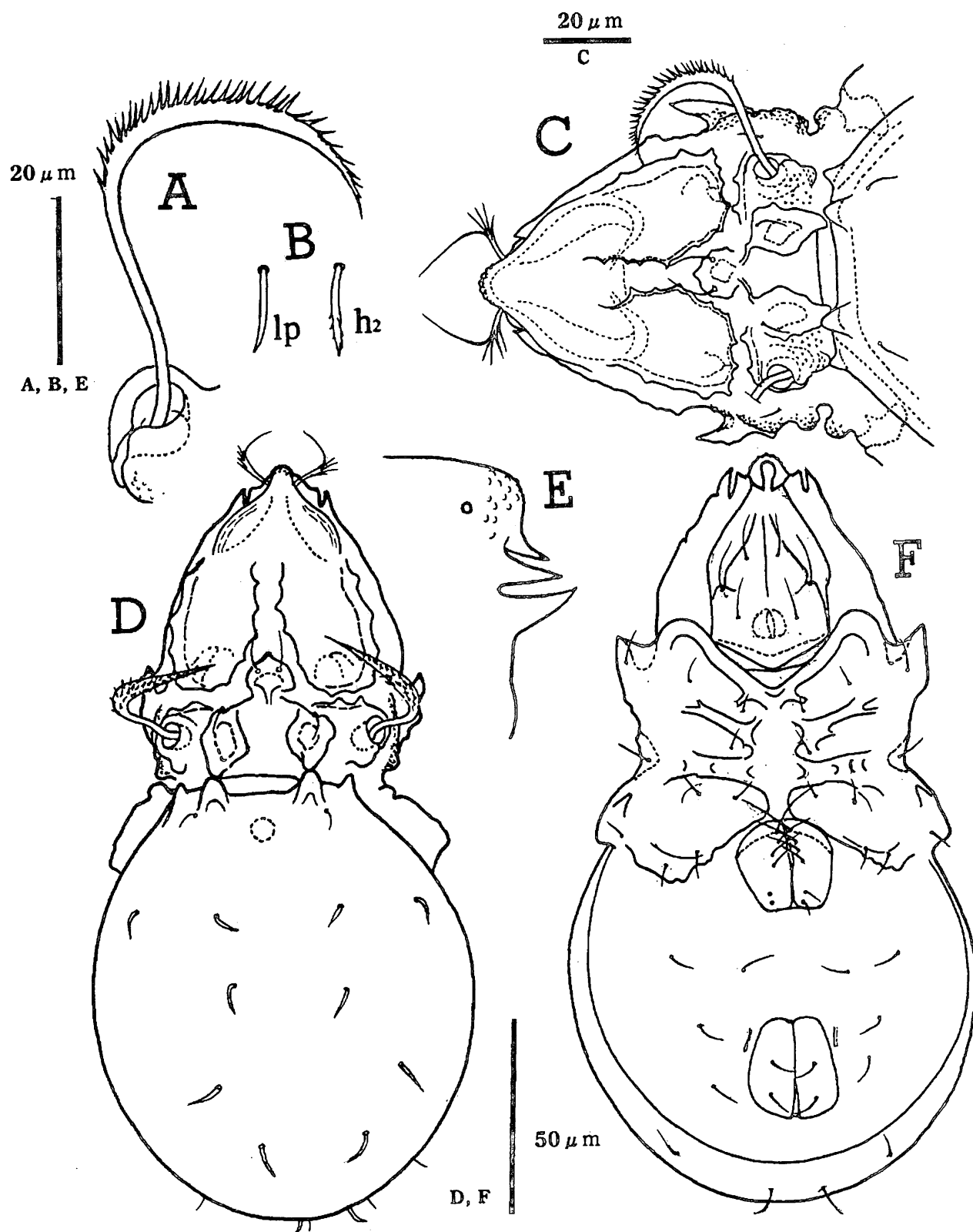


Fig.28: *Suctobelbella lata* sp. n.--- A: Sensillus. B: Dorsal setae of notogaster. C: Rostrum in dorsal view. D: Dorsal aspect. E: Rostral teeth. F: Ventral aspect.

Prodorsal condyle *co.pm* lozenge in shape. Sensillus long, bending inwards like a sickle; its head tapering to the tip; outer margin with many bristles. Seta *le* about as long as seta *in*.

**Notogaster:** Notogaster oval in shape, about 1.1× as long as wide. Notogastral condyles short: *co.nm* thick and blunt at tip, *co.nl* short and pointed at tip. Nine pairs of notogastral setae short: seta *c* thin, inserted just behind *co.nm* and *co.nl*; setae *p*<sub>1</sub> and *p*<sub>2</sub> thin; the other setae thick, often with 3 or 4 short bristles at distal half; seta *la* inserted at the level of seta *lm*. *RLN* of setae: *lm* 7, *lp* 7.

**Ventral aspect:** Six pairs of genital setae; the anterior one longer than the rest pairs. Anal plate about 1.1× as long as genital plate. Relative length of setal intervals: *ag/ag-ag* 0.1, *Ad<sub>3</sub>/ad<sub>3</sub>-ad<sub>3</sub>* 0.2.

**Remarks:** The new species stands very near to *Suctobelbella naginata* (AOKI, 1961), but differs from the latter by (1) tectopedial field widely opened ahead, (2) rostrum rounded and smooth, (3) dorsal setae *c*, *p*<sub>1</sub> and *p*<sub>2</sub> thin, but the remaining setae thick and barbed at distal half.

***Suctobelbella acuta* sp. n.**

[Togarihana-madodani]

(Fig.29)

**Material examined:** Holotype (NSMT-Ac 11364); Ome-shi, Tokyo-to. J. AOKI. 29-X-1997. From litter under grove of *Cryptomeria japonica*. --- 3 paratypes (NSMT-Ac 11365 to 11367): the same data as the holotype. --- 1 ex. Ohnuma Park, Shiobara-cho, Tochigi-ken. 13-XI-1994. From litter under grove of *Quercus mongolica* var. *grosseserrata* and *Aesculus turbinata*. --- 1 ex. Shiratakizawa, Hujiwara-cho, Tochigi-ken. 8-X-1995. From litter under grove of *Fagus crenata*, *F. japonica* and *Aesculus turbinata*. --- 6 exs. Bijodaira, Toyama-ken. Y. HIRAUCHI. From litter under grove of *Fagus crenata*. --- 3 exs. Higashimatadani, Katogai, Uotsu-shi, Toyama-ken. 12-XI-1998. Y. HIRAUCHI.

**Measurements:** (in  $\mu\text{m}$ , *n*=5): Body length 250-285 (av.270), width 140-155 (av.147), L/W 1.8, Length of setae (av.): *le* 20, *c* 21, *lm* 16, *lp* 20.

**Prodorsum:** Rostrum sharply pointed and granulated at tip. Three rostral teeth observed on either side: 1st one short, thin and curved downwards and inwards, 2nd and 3rd ones thick and triangular, sharply pointed at tip.

Forehead behind rostrum smooth and swollen. Tectopedial field widely opened ahead. Sensillus has semilunar head with many short cilia unilaterally. Lamellar knob triangular in shape, but often divided into two parts. Seta *le* about 3× as long as seta *in*. Posterior part of prodorsum densely granulated.

**Notogaster:** Oval shape in dorsal view. Notogastral condyles short: *co.nm* triangular and *co.nl* keel-like, the distance between *co.nm* and *co.nl* about half as long as mutual distance of *co.nm*. Nine pairs of dorsal setae moderately long, thin, smooth and gently curved at basal portion; all setae same length except for *h*<sub>1</sub>, *p*<sub>1</sub>, and *p*<sub>2</sub> which are short; seta *la* inserted at the level between *c* and *lm*; seta *lm* not reaching the insertion of seta *lp*. *RLN* of setae: *lm* 15, *lp* 13.

**Ventral aspect:** Six pairs of genital setae; *g*<sub>5</sub> and *g*<sub>6</sub> at a middle portion along the width of plate, the remainder near inner margin; *g*<sub>1</sub> longer than the rest setae. Anal plate 1.4× as long as genital plate. Setae *ad*<sub>1</sub> inserted at the level to setae *an*<sub>1</sub>. Lyrifissure *iad* situated anterior corner along the anal plate, its posterior end at the level of setae *an*<sub>2</sub>.

**Remarks:** The new species is very similar to *Suctobelbella lata* sp.n., but is distinguishable from the latter by (1) the rostrum sharply pointed at tip, (2) notogastral setae thin and moderately long; setae *la* inserted at the level between setae *c* and *lm*, (3) large body size.

***Suctobelbella solita* sp. n.**

[Nami-madodani]

(Fig.30)

**Material examined:** Holotype (NSMT-Ac 11368); Mt. Kaba, Ibaraki-ken. 9-V-1982. From litter under forest of *Quercus acutissima* and *Q. serrata*. S. CHINONE. ---3 paratypes (NSMT-Ac 11369 to 11371): the same data as the holotype. --- 4 exs. the same data as above mentioned paratypes but 27-VI-1986. --- 1 ex. Mt. Tatsuwara, Ibaraki-ken. 19-VIII-1982. S. CHINONE. From litter under forest of *Fagus crenata* and *Cryptomeria japonica*. ---1 ex. Tamada, Asahi-mura, Ibaraki-ken. 9-V-1979. S. CHINONE. From litter under grove of *Pinus thunbergii*. ---1 ex. Mt. Yamizo, Ibaraki-ken. 28-IX-1981. S. CHINONE. Under forest of *Fagus crenata* and *Quercus mongolica grosseserrata*. --- 1 ex. Mt. Hanakame, Ibaraki-ken. 23-VIII-1984.

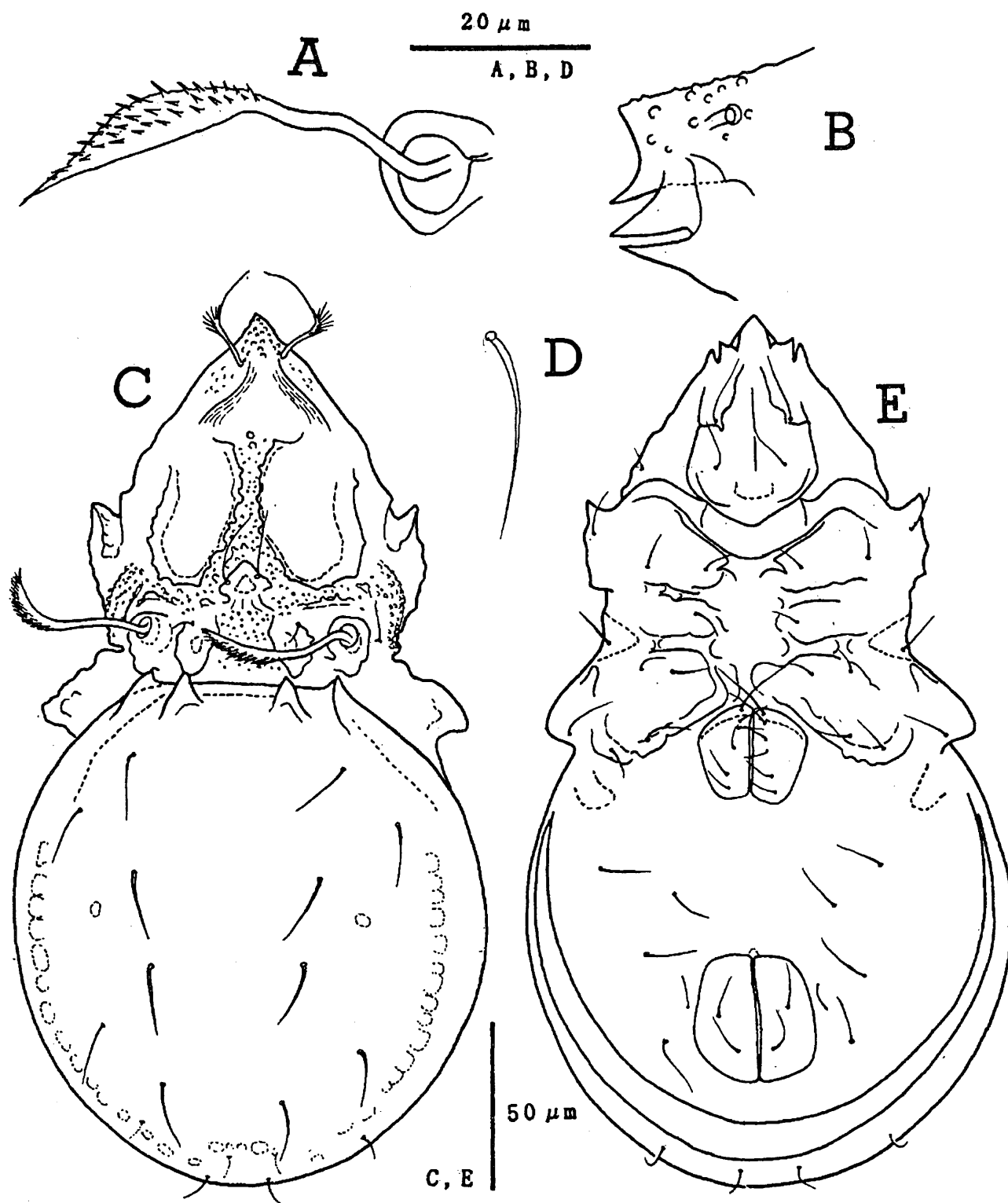


Fig.29: *Suctobelbella acuta* sp. n. --- A: Sensillus. B: Rostral teeth. C: Dorsal aspect. D: Notogastral seta. E: Ventral aspect.

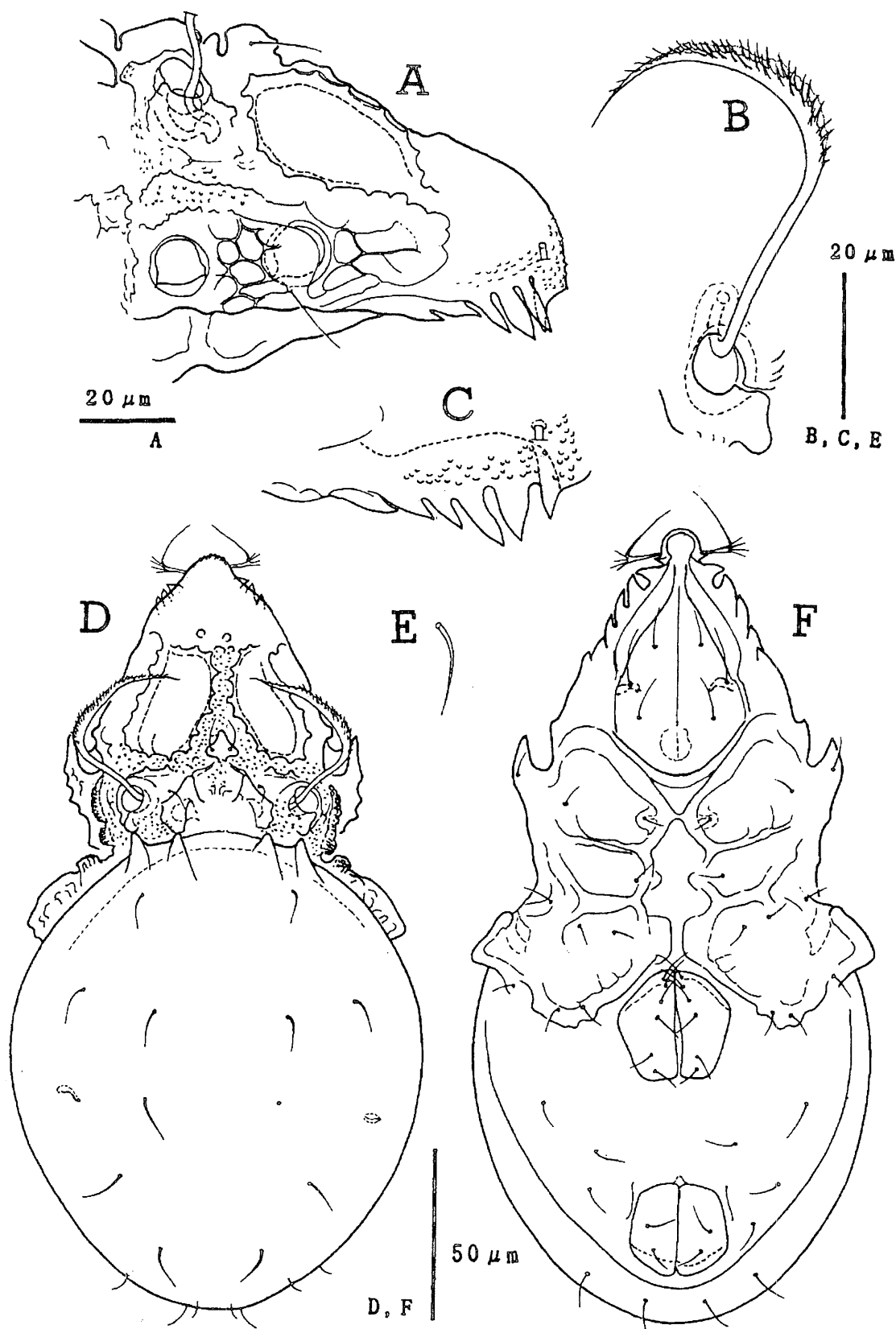


Fig.30: *Suctobelbella solita* sp. n. --- A: Prodorsum in lateral view. B: Sensillus. C: Rostral teeth. D: Dorsal aspect. E: Notogastral seta. F: Ventral view.

S. CHINONE. Under forest of thicket.--- 3 exs. Near Lake Akanko, Hokkaido. 28-VII-1988. S. CHINONE. Under grove of *Quercus mongolica grosseserrata* and *Betula platyphylla japonica*.---3 exs. Near Lake Saroma, Hokkaido. 30-VII-1983. S. CHINONE. From litter under forest of *Picea jezoensis* and maple tree.---2 exs. Cave Ryusendo, Iwate-ken. 8-VIII-1973. S. CHINONE. From litter under grove of *Quercus mongolica grosseserrata*, and maple tree. --- 2 exs. Mt. Hutagami, Toyama-ken. 18-VI-1995. Y. HIRAUCHI. From litter under forest of *Fagus crenata*. --- 1 ex. Bijodaira, Toyama-ken. 18-VI-1995. Y. HIRAUCHI. From litter under forest of *Fagus crenata*. ---1 exs. Yuhoinone, Toyama-ken. Y. HIRAUCHI. --- 3 exs. Hirasawa, Katami, Uotsu-shi, Toyama-ken. 12-IV-1998. Y. HIRAUCHI. From litter under grove of *Aesculus turbinata*. ---3 exs. Uenohara, Kokubu-shi, Kagoshima-ken. K. ISHII & H. SAKAYORI. From litter under laurel forest. --- 1 ex. Tashiro-rindo, Kuriyama-mura, Tochigi-ken. 24-IX-1995. From litter under forest of *Fagus crenata*, *Quercus mongolica grosseserrata* and *Kalopanax pictus*. --- 1 ex. Yakeyamasawa, Hujiwara-cho, Tochigi-ken. 7-X-1995. From litter under grove of *Kalopanax pictus*, *Zelkova serrata* and *Castanea crenata*.--- 2 exs. Chinenson, Okinawa-ken. 5-V-1974. S. CHINONE. From litter under grove of *Acacia julibrissin*.

**Measurements:** (in  $\mu\text{m}$ ,  $n=10$ ): Body length 220-238 (av.222), width 110-130 (av.122), L/W 1.8. Length of setae: *le* 11, *c* 9, *lm* 12, *lp* 13.

**Prodorsum:** Rostrum rounded, smooth but apically granulated. About 5 to 6 rostral teeth: 1st one just under the insertion of seta *ro*, short and acute, directing downwards, 2nd one long and thick, 3rd one slightly shorter than 2nd one and thin, 4th and 5th ones short, 2nd one to 5th one bending anteriorly, all teeth pointed at tip. Lamellar knob small and triangular in shape. Some large granules in front of the tectopedial fields. Surface except for rostral area densely granulated. Seta *le* about as long as seta *in*. Sensillus sickle-like; its slender head with many short fine bristles on outer margin.

**Notogaster:** Notogaster oval in shape, about 1.1 $\times$  as long as wide. Notogastral condyles short; *co.nm* about as long as *co.nl*. Nine pairs of dorsal setae short, smooth and thin; seta *c* inserted at a distance from condyles; seta *la* at a level to seta *lm*. Lyrifissure *im* situated at a level to seta *lp*. RLN of setae: *lm* 9, *lp* 10.

**Ventral aspect:** Six pairs of genital setae, about equal in length one another; setae *g*<sub>5</sub> and *g*<sub>6</sub> situated closely at a middle portion along the width of plate; setae *g*<sub>1</sub> to *g*<sub>4</sub> converging anteriorly to inner margin. Anal plate about 1.2 $\times$  as long as genital plate. Setal formula of epimerata: 3-1-3-3. Relative length of setal intervals:  $ag-ag > ad_2-ad_2 > ad_3-ad_3 = ad_1-ad_1$ ; the ratio of length to intervals:  $ag/ag-ag$  0.2,  $ad_3/ad_3-ad_3$  0.4.

**Remarks:** The new species stands closely to *Suctobelbella naginata* and *S. lata* sp.n. but distinguishable from the latter two species by (1) about 6 rostral teeth, (2) surface of prodorsum except for rostral area densely granulated, (3) sensillus sickle-like with slender head, (4) lamellar knob small and triangular in shape, (5) setae *la* inserted at a level a little anterior to setae *lm*, (6) Lamellar knob small and triangular in shape.

*Suctobelbella latipectoralis* sp. n.

[Hiromune-madodani]

(Fig.31)

**Material examined:** Holotype (NSMT-Ac 11372); Mt. Tatsuware, Ibaraki-ken, 28-III-1982. S. CHINONE. From litter under forest of *Quercus mongolica grosseserrata*. ---2 paratypes (NSMT-Ac 11373 and 11374): the same data as the holotype. --- 1 ex. Ohwada, Hokoda-machi, Ibaraki-ken, 9-V-1979. S. CHINONE. From litter under grove of *Pinus densiflora*.--- 10 exs. Tomikawa, Monbetsu-cho, Hokkaido. 29-VIII-1983. S. CHINONE. From litter under forest of *Quercus mongolica grosseserrata*. --- 1 ex. Tsuwano-cho, Shimane-ken, 28-III-1972. S. CHINONE. From litter under grove of *Pinus densiflora*.

**Measurements:** (in  $\mu\text{m}$ ,  $n=8$ ): Body length 250-260 (av.256), width 140-150 (av.147), L/W 1.7. Length of setae (av.): *le* 15, *c* 12, *lm* 20, *lp* 18. The ratio of length to intervals:  $lm/lm-lp$  0.7.

**Prodorsum:** Body relatively large. Rostrum rounded, with about 5-6 teeth; 1st one short and acute, 2nd one thick triangular, the rest ones short and thin. Apical tip of rostrum granulated. Forehead swollen and smooth. The area between and posterior to tectopedial fields rather wide, arranged some short ridges and many granules. Tectopedial field oval in shape. Lamellar knob pentagonal in shape, often bifurcated at anterior tip. The head of sensillus crescent in shape, with many thick bristles on its outer edge.



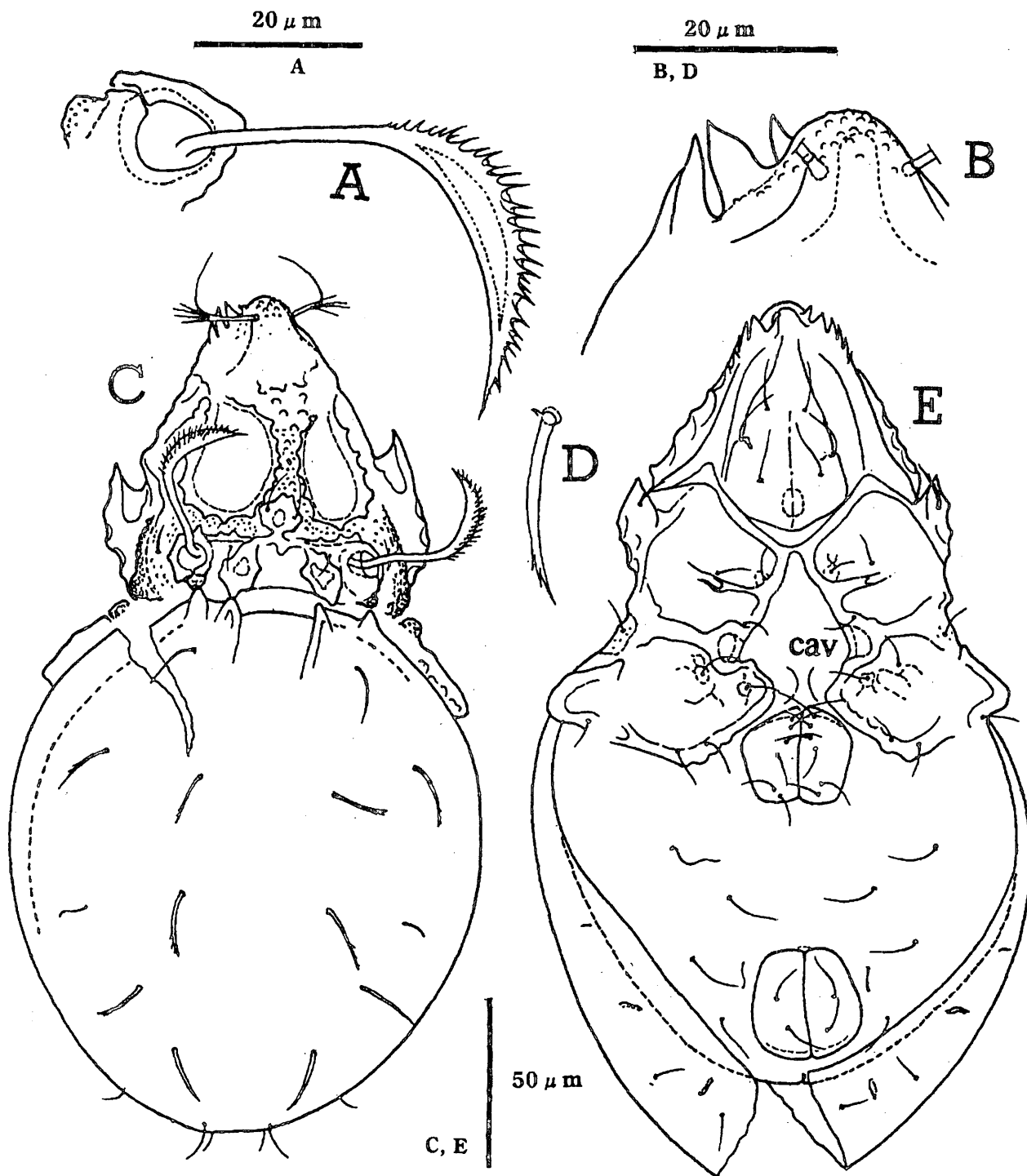


Fig.31: *Suctobelbella latipectoralis* sp. n. --- A: Sensillus. B: Rostral teeth. C: Dorsal aspect. D: Notogastral seta. E: Ventral aspect.

**Notogaster:** Notogaster oval in shape, about  $1.1\times$  as long as wide, broader at the level of setae *lm*. Notogastral condyles well developed: *co.nm* triangular, its inner ridge extending backwards beyond the insertion of setae *c*; *co.nl* short and coniform. Nine pairs of dorsal setae short and gently curved; setae *lm*, *la* and *lp* rather thick and barbed at distal part, while *p*<sub>1</sub>, *p*<sub>2</sub> and *h*<sub>1</sub> short, setiform and smooth. *RLN* of setae: *lm* 13, *lp* 12.

**Ventral aspect:** Right and left epimerata removed far from each other and intervals of them widest at the level of *cav*, which is comparatively large. Epimeral seta *1c* thick and weakly barbed. Six pairs of genital setae; foremost pairs relatively long. Anal plate  $1.2\times$  as long as genital plate. Relative length of setal intervals:  $ag-ag > ad_2-ad_2 > ad_1-ad_1 \geq ad_3-ad_3$ .

**Remarks:** The new species is distinguishable from its congeners by, (1) the shape of notogastral setae: *lm*, *la* and *lp* thick and barbed at distal part, (2) the head of sensillus crescent-shaped, (3) right and left epimerata removed far from each other.

*Suctobelbella hokkaidoensis* sp.n.

[Kita-madodani]

(Fig.32)

**Material examined:** Holotype (NSMT-Ac 11375); Near Lake Mashuko, Hokkaido, 29-VII-1983. S. CHINONE. From litter under grove of *Betula ermani* and *Picea jezoensis*. --- 5 paratypes (NSMT-Ac 11376 to 11380); the same data as the holotype.---2 exs. Near Lake Saroma, Hokkaido, 30-VII-1983. S. CHINONE. From litter under forest of *Picea jezoensis* and maple trees.--- 1 ex. Near Lake Akanko, Hokkaido, 28-VII-1983. S. CHINONE. From litter under grove of *Quercus mongolica grosseserrata* and *Betula platyphylla japonica*.--- 3 exs. The foot of Mt. Hodaka, Nagano-ken. 31-I-1971. S. CHINONE. From litter under grove of *Quercus serrata* and *Cryptomeria japonica*.

**Measurements:** (in  $\mu\text{m}$ ,  $n=4$ ): Body length 270-300 (av. 285), width 150-198 (av.170), L/W 1.7. Length of setae: *le* 22, *c* 25, *lm* 24, *lp* 19. The ratio of length to intervals: *lm/lm-lp* 0.7.

**Prodorsum:** Rostral apex rounded and granulated. Four rostral teeth: 1st one short and acute, 2nd one large triangular, 3rd and 4th ones rather thick and obtuse. Forehead of prodorsum smooth and very swollen behind setae *ro*. Tectopedial field elongate rectangular in shape.

Lamellar knob rather hexagonal in shape. Prodorsal surface granulated between tectopedial fields and around bothridia. Some large tubercles or short ridges found between tectopedial fields. Head of sensillus spindle-shaped with short bristles and sharply pointed at tip.

**Notogaster:** Notogaster oval in shape, about  $1.1\times$  as long as wide. Notogastral condyles rather developed; *co.nl* slender coniform, *co.nm* short triangular. Nine pairs of dorsal setae short and smooth, gently curved and bending at basal portion: setae *p*<sub>1</sub> and *p*<sub>2</sub> shortest and fine; the ratio of length to intervals: *lm/lm-lp* 0.7. *RLN* of setae: *lm* 13, *lp* 11.

**Ventral aspect:** Epimeral cavity not developed. Anal plate about  $1.1\times$  as long as genital plate. Six pairs of genital setae; *g*<sub>1</sub> longest,  $1.5\times$  as long as the rest setae; only alveoli of *g*<sub>6</sub> possessed by the holotype. Setal formula of epimerata: 3-1-3-3. Relative length of setal intervals:  $ag-ag > ad_2-ad_2 > ad_1-ad_1 > ad_3-ad_3$ .

**Remarks:** The new species is discriminated from its congeners by the following points; (1) forehead of notogaster smooth and very swollen behind setae *ro*, (2) the head of sensillus spindle-shaped, pointed at tip with short bristles, (3) notogastral setae short and smooth, (4) body comparatively large.

*Suctobelbella magnicava* sp. n.

[Muneana-madodani]

(Fig.33)

**Material examined:** Holotype (NSMT-Ac 11381); the Shibetsu-Toge, Hokkaido, 31-VII-1983. S. CHINONE. From litter under forest of *Quercus mongolica grosseserrata* and *Betula ermani*. --- 3 paratypes (NSMT-Ac 11382 to 11384); the same data as the holotype.--- 2 exs. The Kashima Shrine, Ibaraki-ken, 19-VIII-1981. S. CHINONE. From litter under forest of *Castanopsis cuspidata*, *C. myrsinaefolia* and *Cryptomeria japonica*.

**Measurements:** (in  $\mu\text{m}$ ,  $n=6$ ): Body length 195-215 (av.203), width 100-120 (av.112), L/W 1.8. Length of setae: *le* 11, *c* 25, *lm* 30, *lp* 28.

**Prodorsum:** Rostrum slightly convex medially, bilaterally with a wide and rounded lobe, followed by 4 teeth: 1st one thick and curved forwards, 2nd one thin triangular with acute tip, 3rd and 4th ones short, tiering to 2nd one. Forehead of prodorsum granulated.

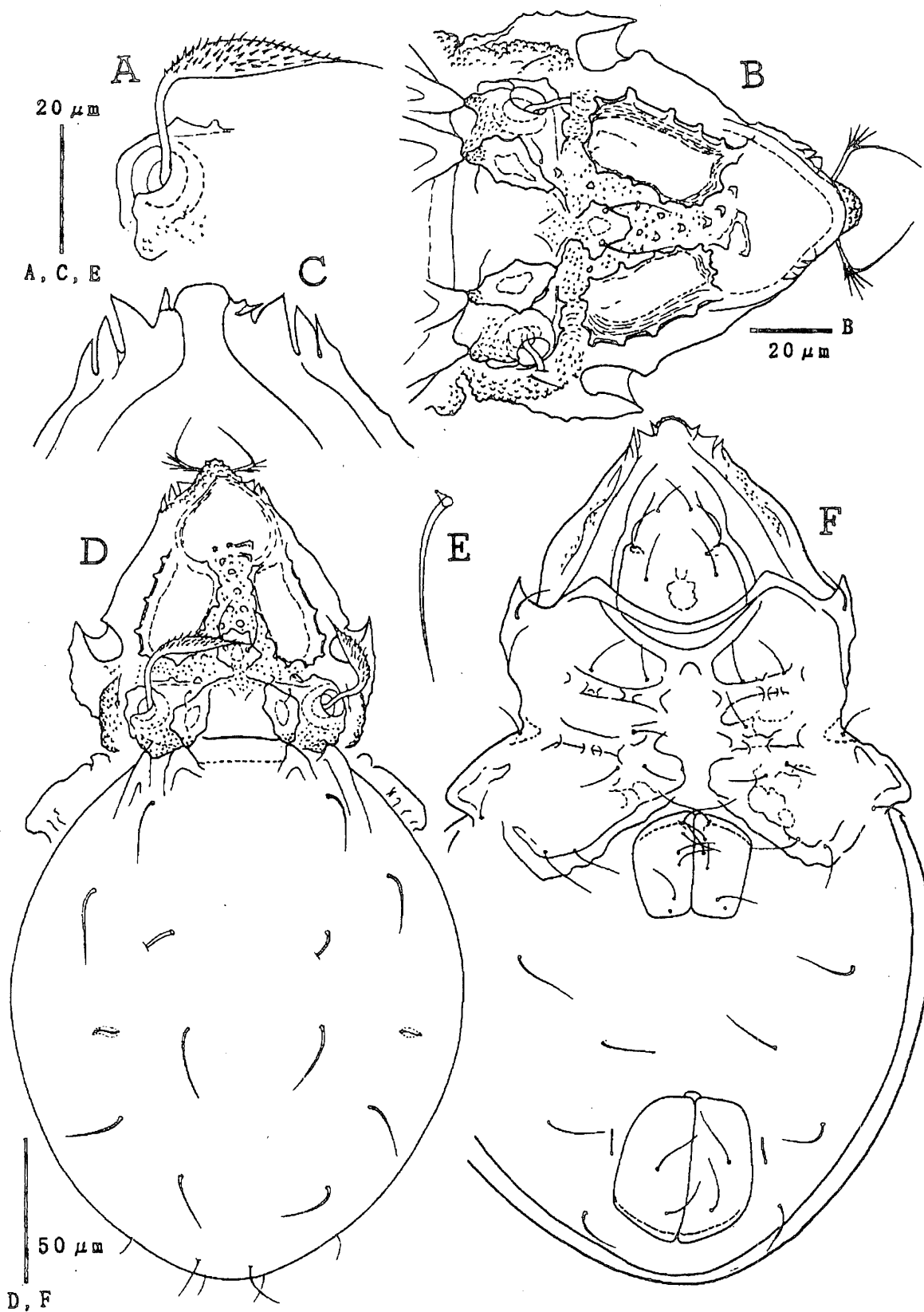


Fig.32: *Suctobelbella hokkaidoensis* sp. n. --- A: Sensillus. B: Prodorsum in dorsal view. C: Rostral teeth. D: Dorsal aspect. E: Notogastral seta. F: Ventral view.

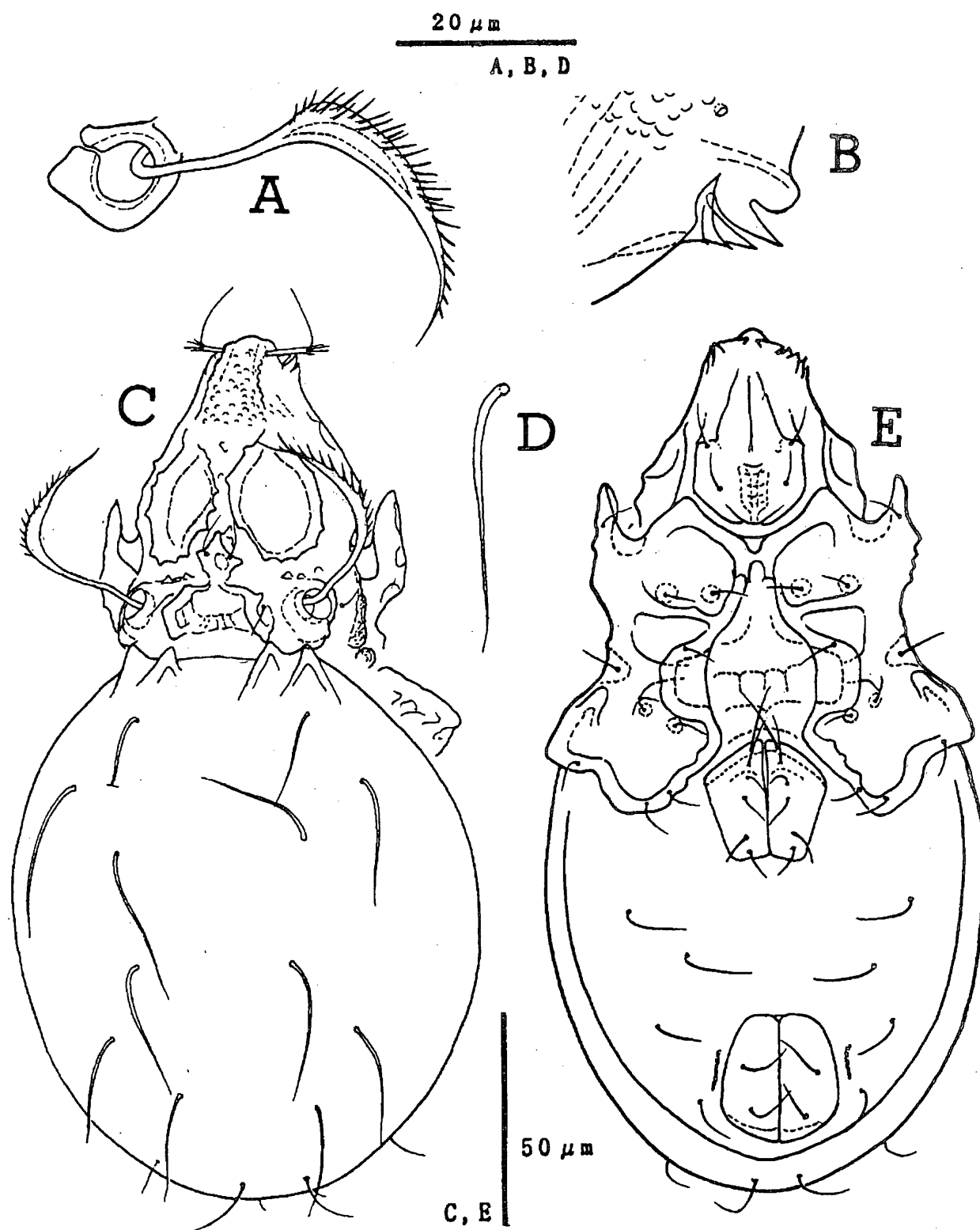


Fig.33: *Suctobelbella magnicava* sp. n.--- A: Sensillus. B: Rostral teeth. C: Dorsal aspect. D: Notogastral seta. E: Ventral aspect.

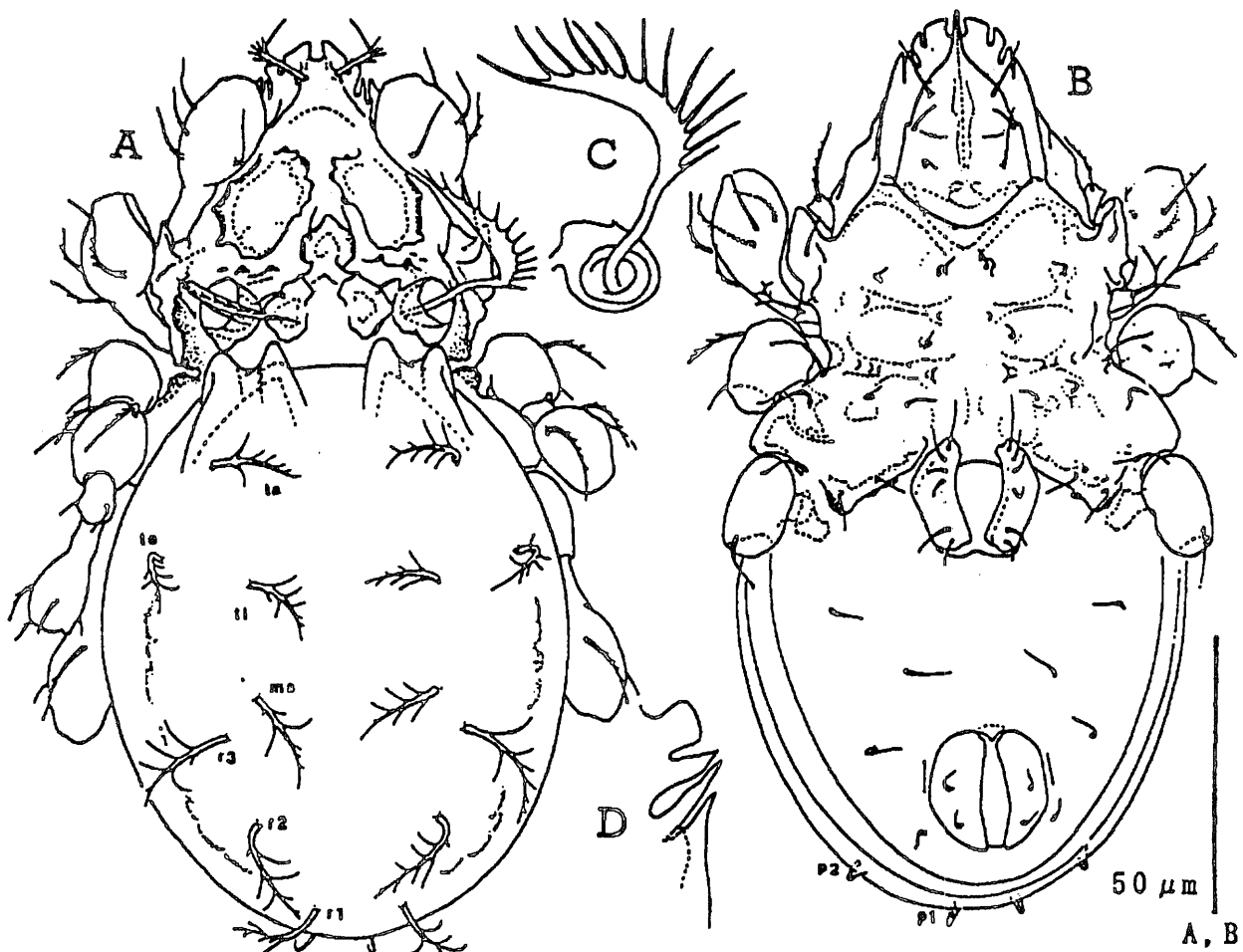


Fig.34: *Suctobelbella tohokuensis* ENAMI et CHINONE, 1997....A: Dorsal aspect, B: Ventral aspect, C: Bothridial region and sensillus, D: Rostral teeth. (after ENAMI & CHINONE, 1997)

Tectopedial field oval in shape and well defined. Lamellar knob rather triangular with pointed tip ahead. Sensillus sickle-like, its head being thick basally and tapering to the tip, and outer margin of head beset with rather long fine bristles.

**Notogaster:** Rather oblong oval in shape, about 1.2× as long as wide. Notogastral condyles short; *co.nm* about as long as *co.nl*. Nine pairs of notogastral setae setiform and moderately long, smooth, curved at basal portion; rather equal in length to one another except for setae *p*<sub>1</sub> and *p*<sub>2</sub>, which are short and fine; seta *la* inserted at the level between seta *c* and *lm*; seta *c* reaching the insertion of seta *la* but not to seta *lm*. *RLN* of setae: *lm* 23, *lp* 22.

**Ventral aspect:** Large epimeral cavity *cav* situated

median end of *apo.sj*. Right and left epimerata widely separated by sternal epimera, especially at the level of *cav*. Six pairs of genital setae: *g*<sub>1</sub> longer than the rest. Setal formula of epimerata: 3-1-3-3. Relative length of setal intervals: *ag-ag* > *ad*<sub>2</sub>-*ad*<sub>2</sub> > *ad*<sub>3</sub>-*ad*<sub>3</sub> > *ad*<sub>1</sub>-*ad*<sub>1</sub>. The ratio of length to intervals: *ag/ag-ag* 0.2, *ad*<sub>3</sub>/*ad*<sub>3</sub>-*ad*<sub>3</sub> 0.3.

**Remarks:** The new species stands near to *Suctobelbella latipectoralis* sp.n. but discriminated from the latter by (1) epimeral cavity larger than the latter, (2) the shape of rostral lobe and teeth; rounded lobe and tiering teeth not present in the latter, (3) the notogastral setae fine setiform, medium length, longer than the latter. (4) sensillus sickle-like, its head thick basally and tapering at tip.

***Suctobelbella tohokuensis* ENAMI et CHINONE, 1997**  
[Tohoku-madodani]

(Fig.34)

*Suctobelbella tohokuensis* ENAMI et CHINONE, 1997,  
p.1-4, fig.10.

**Diagnosis:** Notogastral setae feather-like, provided 4-5 long to short branches except p-series. Rostral tip with a U-shaped indentation. Rostrum has 4 pairs of teeth laterally. Sensillar head with about 12 long cilia on outer edge. Six pairs of genital setae. Body length: 157-174 $\mu$ m, width: 75-90 $\mu$ m.

**Distribution:** Japan.

***Suctobelbella parva* sp. n.**  
[Chibi-madodani]

(Fig.35)

**Material examined:** Holotype (NSMT-Ac 11385); Kurakake, Uenohara-cho, Kokubu-shi, Kagoshima-ken. 30-III-1990. K. ISHII & H. SAKAYORI. From litter under laurel forest. --- 2 paratypes (NSMT-Ac 11386 and 11387): the same data as the holotype. --- 1 ex. Mt. Hanakame, Daigo-machi, Ibaraki-ken. 23-VIII-1984. S. CHINONE. From litter under forest of *Fagus crenata* and *Abies firma*.

**Measurements:** (in  $\mu$ m, n=3): Body length 160-173 (av.167), width 84-93 (av. 89), L/W 1.9. Length of setae: *le* 10, *c* 14, *lm* 18, *lp* 26.

**Prodorsum:** Rostral tip medially incised with large truncate lobe bilaterally, followed by 3 teeth: 1st one thick and triangular, 2nd and 3rd ones narrow and sharp. Median rostral area elevated vertically but its surface flat and granulated. Tectopedial field narrow and rather clearly defined. Lamellar knob large and semicircular or rounded trapezoid in shape. Some tubercles found: about 3 connected ones in front of lamellar knob, about 2 or 3 ones before bothridia and behind rostrum. Sensillus sickle-like; its head with short bristles on outer edge and very long, tapering tip.

**Notogaster:** Notogaster oval in shape, 1.1 $\times$  as long as wide. Notogastral condyles *co.nl* rather long with rounded tip, *co.nm* short and sharp triangular. Nine pairs of long, thick dorsal setae: the setae gently curved and barbed at distal half; seta *lm* not reaching the insertion of seta *lp*; seta *lp* and *h*<sub>2</sub> long and reaching the insertion of each succeeding seta *h*<sub>2</sub> and *h*<sub>1</sub>. *RLN* of setae: *lm* 17, *lp* 25.

**Ventral aspect:** Epimeral cavity not developed. Epimeral region with some vague patterns. Genital plate about as long as anal plate. Relative length of setal intervals: *ag-ag*>*ad*<sub>2</sub>-*ad*<sub>2</sub>>*ad*<sub>3</sub>-*ad*<sub>3</sub>>*ad*<sub>1</sub>-*ad*<sub>1</sub>. The ratio of length to intervals: *ag/ag-ag* 0.2, *ad*<sub>3</sub>/*ad*<sub>3</sub>-*ad*<sub>3</sub> 0.3.

**Remarks:** The new species is small in size and stands near to *Suctobelbella kantoensis* sp. n., but is discriminated from the latter by (1) the tip of sensillus smooth, not barbed, (2) dorsal setae not so thick as the latter, (3) setae *lp* and *h*<sub>2</sub> long, reaching the insertion of succeeding seta *h*<sub>2</sub> and *h*<sub>1</sub>, respectively, (4) setal intervals *ad*<sub>3</sub>-*ad*<sub>3</sub> wider than *ad*<sub>1</sub>-*ad*<sub>1</sub>.

***Suctobelbella aokii* sp. n.**  
[Aoki-madodani]

(Fig.36)

**Material examined:** Holotype (NSMT-Ac 11388); Mt. Kiyosumi, Chiba-ken. 18-XII-1983. From litter under forest of *Cyclobalanopsis glauca*. S. CHINONE.---4 paratypes (NSMT-Ac 11389 to 11392): the same data as the holotype.---1 ex. From litter under forest of *Abies firma*. The other data as the holotype.--- 2 exs. Mt. Hanakame, Ibaraki-ken. 23-VIII-1984. S. CHINONE. From litter under copse. --- 1 ex. Bijodaira, Toyama-ken. 12-VII-1998. Y. HIRAUCHI. From litter under grove of *Fagus crenata*. ---1 ex. Mt. Daisen, Tottori-ken, from moss. S. CHINONE. --- 1 ex. Tsuwano-cho, Shimane-ken. 28-III-1972. From litter under grove of *Pinus densiflora*. S. CHINONE.

**Measurements:** (in  $\mu$ m, n=5): Body length 175-220 (av.188), width 100-109 (av.104), L/W 1.8. Length of setae (av.): *le* 11, *c* 26, *lm* 30, *lp* 26.

**Prodorsum:** Rostral tip rounded in dorsal view but medially incised slightly in ventral view and with rectangular lobe bilaterally. About 3 rostral teeth present; 1st one large and triangular, 2nd and 3rd ones acute, touching each other. Rostral area elevated longitudinally and with many granules. Tectopedial fields elongate oval in shape and well defined. Lamellar knob about hexagonal in shape with pointed corners. Sensillus scythe-shape; long, slender head with rather long cilia arranging on outer border densely. Setae *in* short and fine.

**Notogaster:** Notogaster long oval in shape, about 1.2 $\times$  as long as wide. Notogastral condyles *co.nl* coniform, *co.nm* triangular. Nine pairs of long setiform dorsal setae; the setae gently curved and bending at basal portion; setae

*c, lm* and *la* barbed at distal one third in high

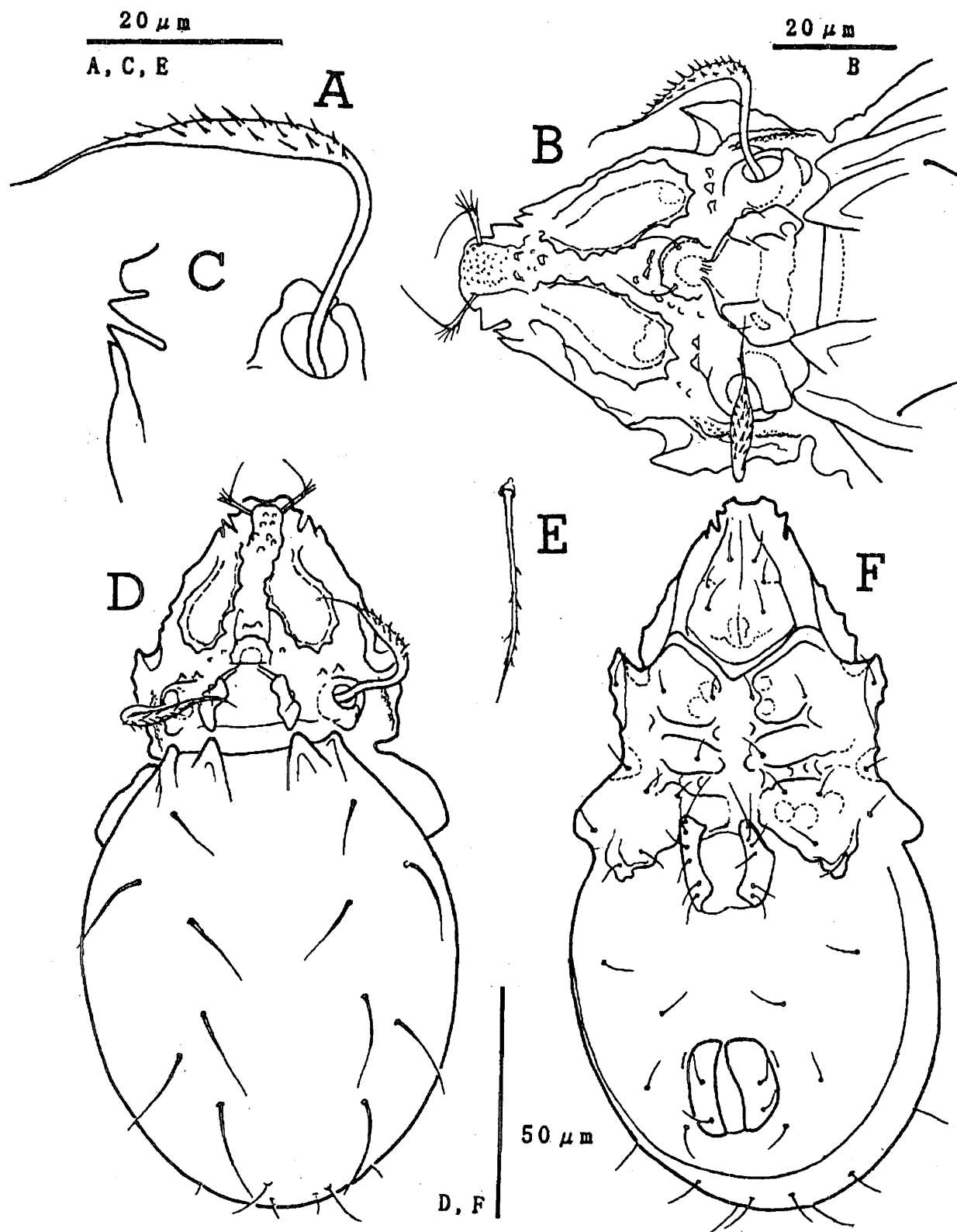


Fig.35: *Suctobelbella parva* sp. n. --- A: Sensillus. B: Prodorsum in dorsal view. C: Rostral teeth. D: Dorsal aspect. E: Notogastral seta. F: Ventral aspect.

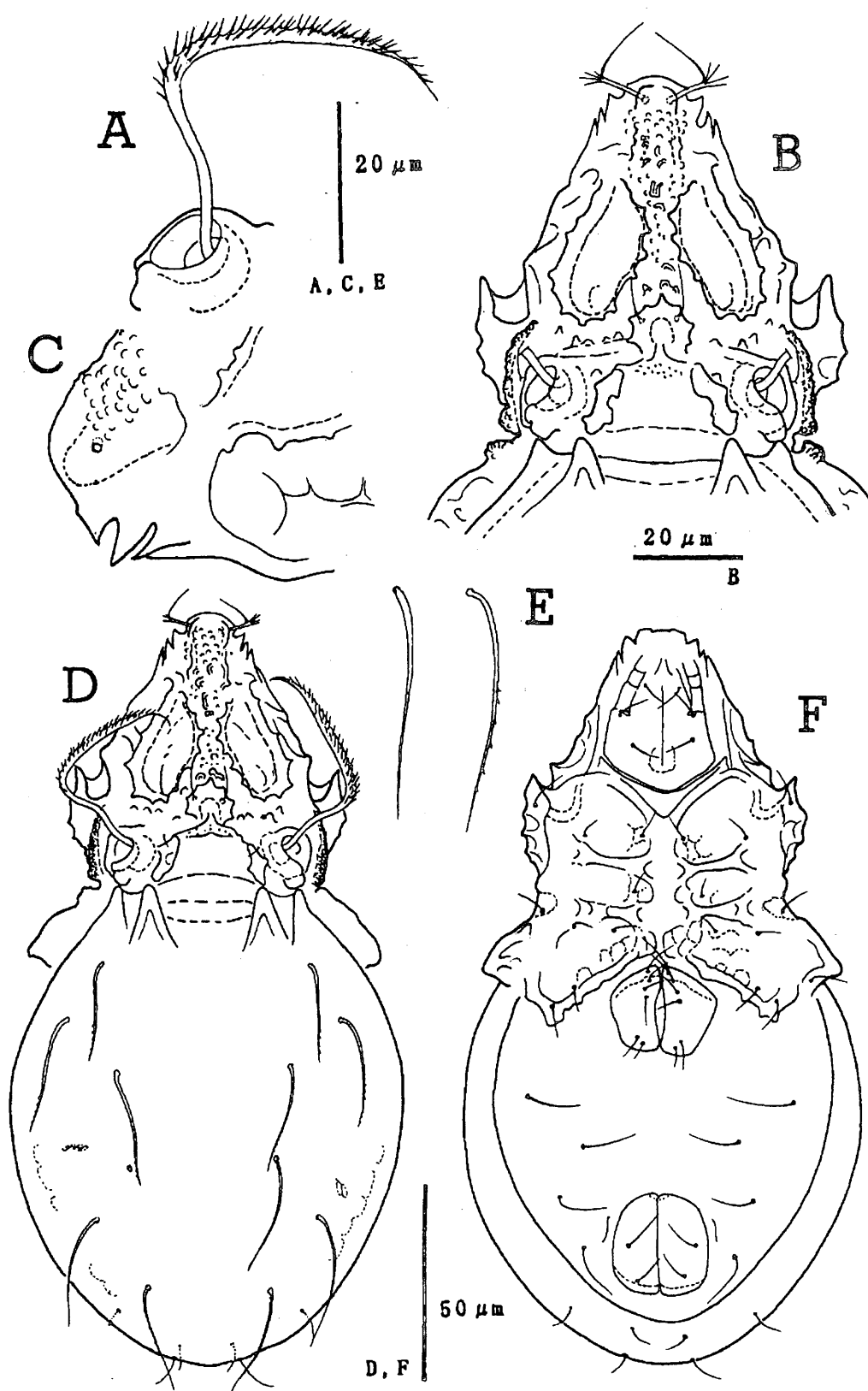


Fig.36: *Suctobelbella aokii* sp. n. --- A: Sensillus. B: Prodorsum in dorsal view. C: Rostrum in lateral view. D: Dorsal aspect. E: Dorsal setae of notogaster. F: Ventral aspect.



magnification; setae  $p_1$ ,  $p_2$  and  $h_1$  short,  $p_1$  about  $0.5\times$  as long as seta  $ad_1$ ; setae  $lm$  reaching beyond the insertions of setae  $lp$ . *RLN* of setae:  $lm$  25,  $lp$  22.

**Ventral aspect:** Epimeral cavity not developed. Six pairs of genital setae;  $g_1$  longer than the lest. Setal formula of epimerata: 3-1-3-3. Genital plate  $1.2\times$  as long as anal plate. Relative length of setal intervals:  $ag-ag>ad_2-ad_2\geq ad_3-ad_3=ad_1-ad_1$ , the ratio of length to intervals;  $ag/ag-ag$  0.2,  $ad_3/ad_3-ad_3$  0.3.

**Remarks:** The new species stands nearer to *Suctobelbella subcornigera* (FORSSLUND, 1941) n. comb. and *S. parva* sp.n., but distinguished from the latter two species by following points, (1) sensillus scythe-shape, long, slender head with long cilia, (2) the shape of rostral region; shallow incised rostral apex and 3 lateral teeth, (3) the setae  $lm$  reaching beyond the insertions of setae  $lp$ .

**Etymology:** The specific name was dedicated to Dr. Jun-ichi AOKI, Director of Kanagawa Prefectural Museum of Natural History who gave me continuous encouragement and valuable advice.

***Suctobelbella subcornigera* (FORSSLUND, 1941)**

**comb. n.**

[Toge-tibimadodani]

(Fig.37)

*Suctobelba subcornigera* FORSSLUND, 1941, p.381-396.

*Suctobelba subcornigera*: MORITZ, 1964, p.373-378, Figs. 2,3b.

*Suctobelba vera* MORITZ, 1964, p.373-378, Figs.1, 3a.

**Material examined:** 1 ex. Mt. Raus, Hokkaido, 29-VII-1983. S. CHINONE. From litter under forest of *Betula ermani* and *Picea jezoensis*.--- 1 ex. Neaar Lake Saroma, Hokkaido, 30-VII-1983. S.CHINONE. From litter under grove of *Picea jezoensis* and maple trees.--- 1 ex. Shiratakizawa, Huijiwara-cho, Tochigi-ken. 8-X-1995. From litter under forest of *Fagus crenata*, *F. japonica* and *Aesculus turbinata*.--- 1 ex. Oonuma Park, Fujiwara-cho, Tochigi-ken. 13-XI-1994. From litter under grove of *Fagus crenata*, *Quercus mongolica grosseserrata* and *Aesculus turbinata*. --- 2 exs. Yakeyamazawa, Fujiwara-cho, Tochigi-ken. 7-X-1995. From litter under grove of *Kalopanax pictus*, *Castanea crenata* and *Zelkova serrata*. 1 ex. Mugiiizaka, Kuroiso-shi, Tochigiken.--- 1 ex. Mizukaido-shi, Ibaraki-ken. 5-V-1971. S. CHINONE. From litter under grove of *Quercus acutissima*. --- 1 ex.

the Omotari Shrine, Toride-shi, Ibaraki-ken. 27-V-1979. S. CHINONE. From litter under grove of *Castanopsis cuspidata*.

**Measurements:** (in  $\mu\text{m}$ ,  $n=5$ ): Body length 174-195 (av.186), width 100-120 (av.111), L/W 1.7. Length of setae (av.):  $le$  12,  $c$  25,  $lm$  26,  $lp$  27.

**Prodorsum:** Rostral tip medially incised, with rectangular lobe bilaterally, followed by 3 rostral teeth; 1st one long triangular, 2nd one short, obtuse and 3rd ones short with acute tip. Rostral area granulated and bridge-like, dividing by vertical ridges bilaterally. Tectopedial field raindrop-shaped. Lamellar knob rather pentagonal in shape. Some large tubercles found around the lamellar knob. The head of sensillus slender, crescent with many short cilia on its outer edge.

**Notogaster:** Notogaster oval in shape, about  $1.1\times$  as long as wide. Notogastral condyles small: *co.nm* short triangular, *co.nl* conical. Nine pairs of dorsal setae setiform, smooth, rather long and gently curved; seta  $lm$  just reaching the insertion of seta  $lp$ . *RLN* of setae:  $lm$  22,  $lp$  23.

**Ventral aspect:** Epimeral cavity weakly developed. Usually, 6 pairs of genital setae; the holotype possessed of 5 setae on the left genital plate. Setal formula of epimerata: 3-1-3-3. Seta  $ad_1$  inserted at the level between seta  $an_1$  and  $an_2$ . Relative length of setal intervals:  $ag-ag>ad_2-ad_2>ad_1-ad_1>ad_3-ad_3$ . The ratio of length to intervals:  $ag/ag-ag$  0.1,  $ad_3/ad_3-ad_3$  0.3. Anal plate as equal as genital plate in size.

**Remarks:** *Suctobelbella subcornigera* (FORSSLUND, 1941) can be distinguished from its close relative, *S. vera* (MORITZ, 1964), n.comb., by the body length and the shape of sensillus: the sensillar head of *S. subcornigera* slender and crescent with more numerous cilia; that of *L. vera* swollen and spindle-shaped with about 10 long cilia. The Japanese specimens well accord with *S. subcornigera* in body size, number of rostral teeth and shape of sensillus, but, slightly differ from the latter in the shape of frontal tip of rostrum. *Suctobelbella nayoroensis* FUJITA et FUJIKAWA, 1987 also stands near to former two species, but discriminated from them by the shape of rostral teeth and large body size.

**Distribution:** Austria, Germany, Indonesia (Java), New Zealand, Pakistan, Sweden, and Japan.

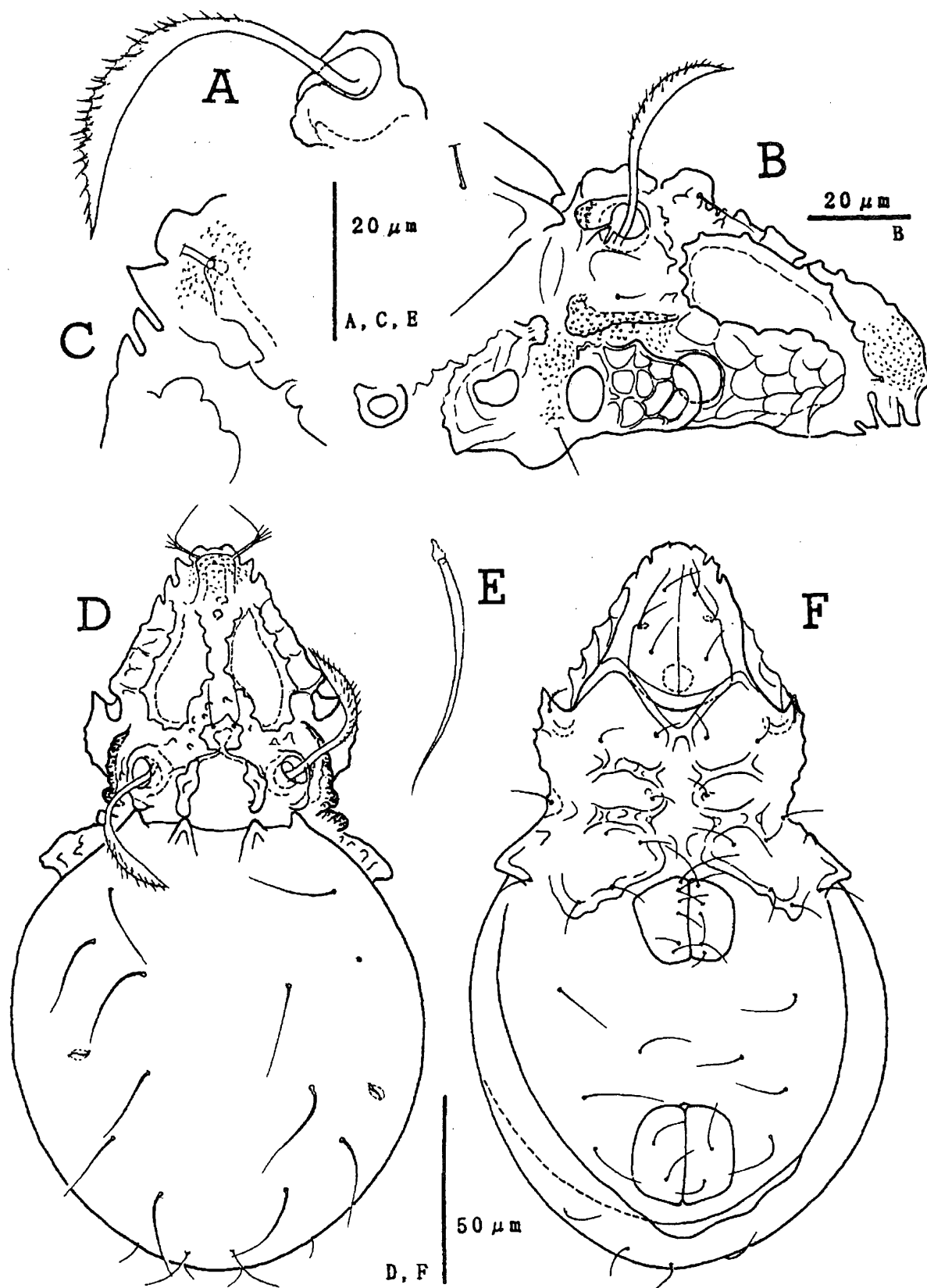


Fig.37: *Suctobelbella subcornigera* (FORSSLUND, 1941) comb. n.--- A: Sensillus. B: Prodorsum in lateral view. C: Rostral teeth. D: Dorsal aspect. E: Notogastral seta. F: Ventral aspect.

***Suctobelbella granifera* sp. n.**

[Kobuhana-madodani]

(Fig.38)

**Material examined:** Holotype (NSMT-Ac 11393); Near Mt. Raus, the Shiretoko Peninsula, Hokkaido. 29-VII-1983. S. CHINONE. From litter under forest of *Betula ermani* and *Picea jezoensis*. --- 5 paratypes (NSMT-Ac 11394 to 11398), the same data as the holotype. --- 2 exs. The Shibetsu Toge, Hokkaido, 31-VII-1983. S. CHINONE. From litter under grove of *Picea jezoensis*, *Quercus mongolica grosseserrata* and *Betula ermani*. --- 1 ex. Mt. Kiyosumi, Chiba-ken. 18-XII-1983. S. CHINONE. From litter under forest of *Abies firma*.

**Measurements:** (in  $\mu\text{m}$ ,  $n=5$ ): Body length 245-283 (av.258), width 130-152 (av.139), L/W 1.9. Length of setae (av.): *le* 19, *c* 32, *lm* 38, *lp* 38.

**Prodorsum:** Rostrum bridge-like, with large tubercles densely. In dorsal view, rostral apex rounded widely, but in ventral view it slightly encised, followed by wide trapezoid lobe and 2 or 3 teeth: 1st and 2nd ones thick and long, 3rd one thin or reduced; a deep excision between 1st and 2nd ones. Tectopedial field rather small elongate oval in shape. Lamellar knob diamond-shaped with long lamellar setae. Large tubercles and short irregular ridges found around lamellar knob and between tectopedial fields. Head of sensillus swollen spindle-shaped with sharply pointed apex, possessing rather long cilia on outer edges coarsely.

**Notogaster:** Notogaster oval in shape, about 1.2 $\times$  as long as wide. Notogastral condyles; *co.nl* slender keel-like with obtuse tip, *co.nm* triangular with obtuse or truncate tip. Nine pairs of notogastral setae: the setae long setiform, gently curved; seta *lm* usually reaching the insertion of seta *lp*; seta *la* inserted at the level between seta *c* and *lm*. RLN of setae: *lm* 22, *lp* 24.

**Ventral aspect:** Epimeral cavity not developed. All epimeral setae long, about as long as the other most ventral setae. Some patterns found near the insertions of inner epimeral setae. Setal formula of epimerata: 3-1-3-3. Genital plate 1.1 $\times$  as long as anal plate. Relative length of genital setae:  $g_6 > g_5 \geq g_4 > g_3 = g_2 = g_1$ . Relative length of setal intervals:  $ag-ag > ad_2-ad_2 > ad_3-ad_3 = ad_1-ad_1$ .

**Remarks:** The new species stands rather near to *Suctobelbella parallelodentata* HAMMER, 1979 and *S. nayoroensis* FUJITA et FUJIKAWA, 1987, but it differs from

the latter two species by, (1) rostral surface with many large tubercles, (2) rostral lobe trapezoid in form, not concave or forked, (3) notogastral seta *lm* just reaching the insertion of seta *lp*.

***Suctobelbella nayoroensis* FUJITA et FUJIKAWA, 1987**

[Nayoro-madodani]

(Fig.39)

*Suctobelbella nayoroensis* FUJITA et FUJIKAWA, 1987, p.4, fig.9.

**Diagnosis:** Rostral margin straight with 3 lateral teeth on each side; the anterior tooth bifid at tip; the second and posterior teeth have a sharp single tip. The distal half of sensillus moderately incrassate, its exterior side being densely barbed. Body length: 250-256 $\mu\text{m}$ , width: 156-184 $\mu\text{m}$ .

**Distribution:** Japan.

***Suctobelbella flagellifera* sp. n.**

[Kunene-madodani]

(Fig.40)

**Material examined:** Holotype (NSMT-Ac 11399); Kotaka, Aso-machi, Ibaraki-ken, 6-VII-1979. S. CHINONE. From litter under grove of *Pinus densiflora* and *Castanopsis cuspidata*. --- 4 paratypes (NSMT-Ac 11400 to 11403), the same data as the holotype. --- 1 ex. Shimasu, Ushibori-machi, Ibaraki-ken. 27-V-1979. S. CHINONE. From litter under grove of *Quercus acutissima*. --- 5 exs. Mt. Kaba, Ibaraki-ken. 27-VI-1986. S. CHINONE. From litter under forest of *Quercus acutissima* and *Q. serrata*. --- 2 exs. Mt. Hanakame, Ibaraki-ken. 23-VIII-1984. S. CHINONE. From litter under deciduous broad-leaved forest. --- 1 ex. Daimyojin, Iwai-shi, Ibaraki-ken. 14-V-1991. S. CHINONE. From litter under grove of *Castanopsis cuspidata* and *Carpinus tschonoskii*. --- 1 ex. Mt. Yamizo, Ibaraki-ken. S. CHINONE. From litter under forest *Quercus mongolica grosseserrata* and *Fagus crenata*. --- 1 ex. Shibetsu Toge, Hokkaido. 31-VII-1983. S. CHINONE. From litter under grove of *Picea jezoensis*, *Quercus mongolica grosseserrata* and *Betula ermani*. --- 3 exs. Mt. Kiyosumi, Chiba-ken. 18-XII-1983. S. CHINONE. From litter under forest of *Cyclobalanopsis glauca*. --- 3 exs. Mt. Sanbe, Shimane-ken. 26-III-1972. S. CHINONE. From litter under grove of *Larix leptolepis*. --- 1 ex. Sonobe-cho, Kyoto-fu. 24-III-1972. S. CHINONE. From litter under grove of *Pinus densiflora*. --- 3 exs..

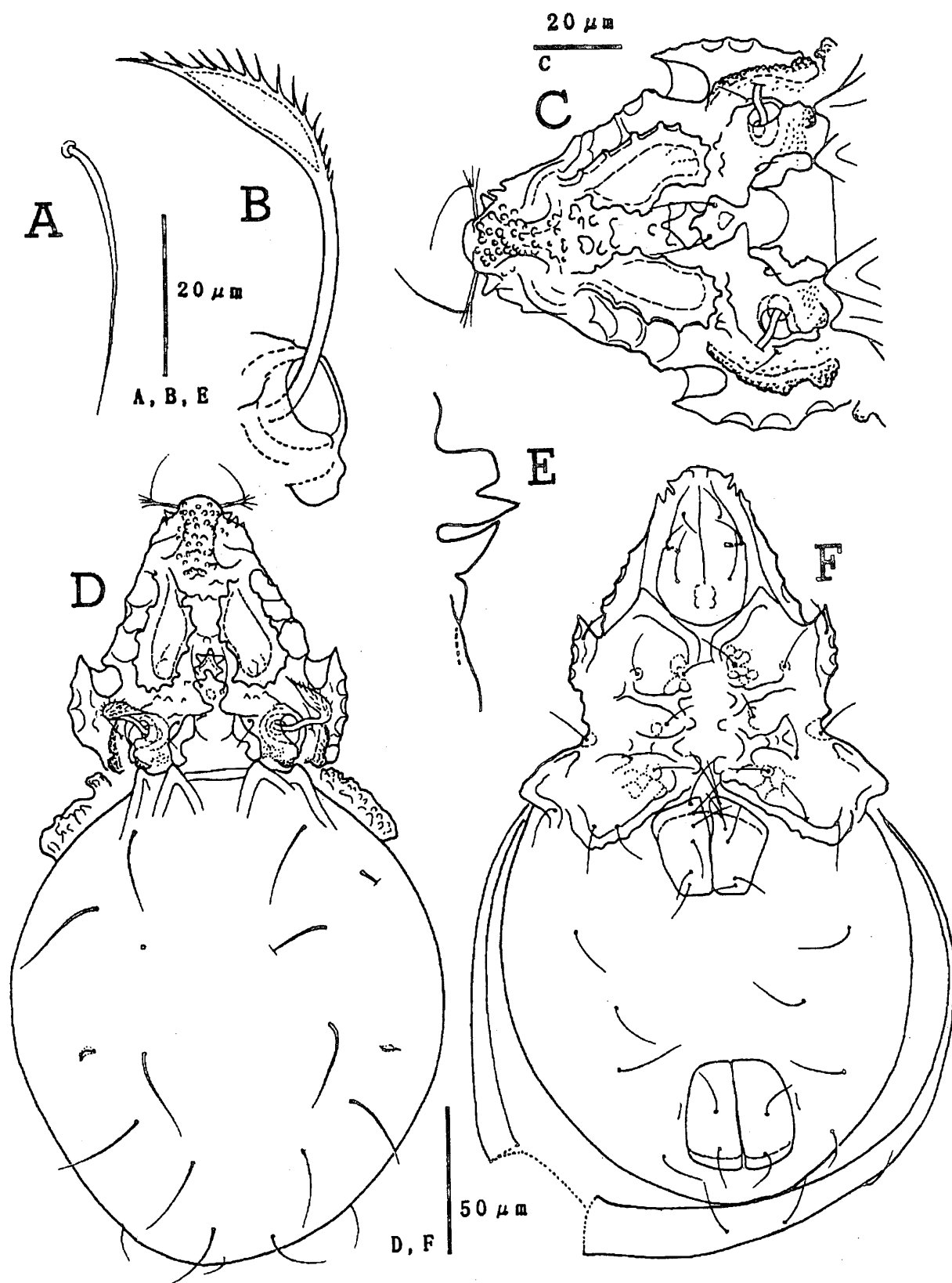


Fig.38: *Suctobelbella granifera* sp. n.--- A: Notogastral seta. B: Sensillus. C: Prodorsum in dorsal view. D: Dorsal aspect. E: Rostral seta. F: Ventral aspect.

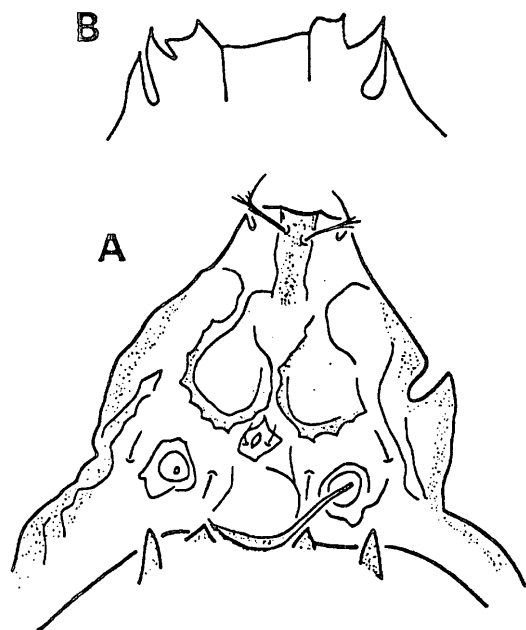


Fig.39: *Suctobelbella nayoroensis* FUJITA et FUJIKAWA, 1987....A: Prodorsum, B: Rostral margin. (after FUJITA et FUJIKAWA, 1987)

Himi-shi, Toyama-ken 2-V-1998. Y. HIRAUCHI. From litter under forest of *Abies firma*.--- 2 exs. Yashima, Takamatsu-shi, Kagawa-ken. S. CHINONE. From litter under forest of *Pinus densiflora*.--- 3 exs. Kurakake, Uenohara-cho, Kokubu-shi, Kagoshima-ken. 30-III-1990. K. ISHII et H. SAKAYORI. --- 1 ex. Makizono, Kirishima-cho, Kagoshima-ken. 31-III-1990. K. ISHII et H. SAKAYORI. From litter under grove of *Castanopsis acuta*.

**Measurements:** (in  $\mu\text{m}$ ,  $n=5$ ): Body length 180-200 (av.189), width 100-120 (av. 109), L/W 1.7. Length of setae (av.):  $le$  12,  $c$  27,  $lm$  34,  $lp$  39.

**Prodorsum:** Rostral apex medially incised in a shallow ditch, with a slightly forked or concave lobe bilaterally, followed by 2 or 3 sharp teeth: 1st one thick, 2nd and 3rd ones thin. Rostrum elevated vertically, with 2 keels running forwards and 2 ridges backwards from the insertion of setae *ro*. Rostral area behind setae *ro* granulated and following some large granules backwards. Tectopedial field elongate oval in shape, with rather closed frontal edge. Lamellar knob pentagonal in shape. Seta *le* about  $2\times$  as long as seta *in*. Sensillus sickle-shaped; the head rather elbowed at right angles, tapering at distal half, with many short bristles on outer margin.

**Notogaster:** Notogaster oval in shape, about  $1.0\times$  as long as wide. Notogastral condyles rather developed; *co.nl* slender, *co.nm* triangular. Nine pairs of notogastral setae; the setae long and sinuate, barbed at distal half, except for seta  $p_1$ ,  $p_2$  and  $h_1$ , which are setiform and short. Lyrifissure *im* found outside of seta *lp* and situated transversely. *RLN* of setae:  $lm$  29,  $lp$  34.

**Ventral aspect:** Six pairs of genital setae:  $g_1$  longer than the rest, about  $2\times$  as long as  $g_6$ . Epimeral cavity not developed. Setal formula of epimerata: 3-1-3-3. Relative length of setal intervals:  $ag-ag > ad_2-ad_2 > ad_3-ad_3 \geq ad_1-ad_1$ . The ratio of length to intervals:  $ag/ag-ag$  0.2,  $ad_3/ad_3-ad_3$  0.3.

**Remarks:** The new species stands near to *Suctobelbella pilifera* (MAHUNKA, 1978), n. comb., but is distinguished from the latter by (1) dorsal setae long and sinuate, barbed at distal half, (2) the shape of rostral area; medially incised as a shallow ditch-shape, with 1 concave lobe and 2 or 3 sharp teeth, (3) sensillus sickle-like; the head tapering at distal half, with many sharp short bristles.

#### *Suctobelbella ancorhina* sp. n.

[Ikarihana-madodani]

(Fig.41)

**Material examined:** Holotype (NSMT-Ac 11404); Uematsu, Hazaki-machi, Ibaraki-ken. 6-VII-1979. S. CHINONE. From litter under grove of *Pinus thunbergii*. --- 5 paratypes (NSMT-Ac 11405 to 11409), the same data as the holotype. --- 1 ex. Tamada, Asahi-mura, Ibaraki-ken. 9-V-1979. S. CHINONE. From litter under grove of *Pinus thunbergii*. --- 1 ex. Itatoi, Near Tone River, Moriya-machi, Ibaraki-ken. 2-XI-1979. S. CHINONE. From litter under grove of bamboo. --- 1 ex. Omotari Shrine, Toride-shi, Ibaraki-ken. 27-V-1979. S. CHINONE. From litter under grove of *Castanopsis cuspidata*. --- 1 ex. Shimasu, Ushibori-machi, Ibaraki-ken. 27-V-1979. S. CHINONE. From litter under grove of *Quercus acutissima*. --- 3 exs. Kotaka, Aso-machi, Ibaraki-ken. 6-VII-1969. S. CHINONE. From litter under grove of *Pinus densiflora* and *Castanopsis cuspidata*. --- 1 ex. Narake, Ohno-mura, Ibaraki-ken. 6-VII-1979. S. CHINONE. From litter under grove of *Pinus densiflora*.---2 exs. Tomikawa, Monbetsu-cho, Hokkaido. 27-VII-1983. S. CHINONE. From litter under grove of *Quercus mongolica grosseserrata*. --- 1 ex.: Tatsukushi, Tosashimizu-shi, Kochi-ken. 22-X-1980. S. CHINONE.

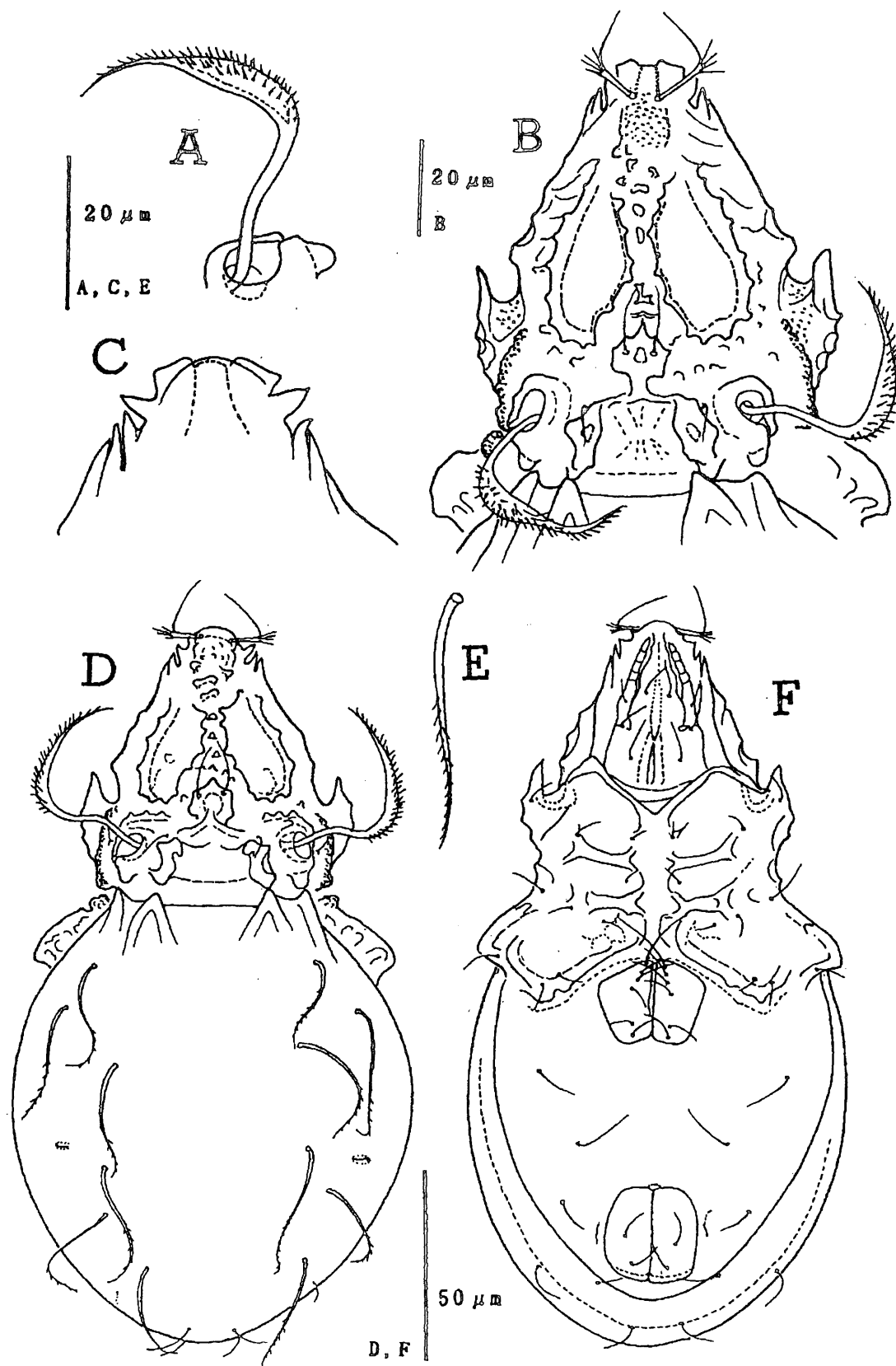


Fig.40: *Suctobelbella flagellifera* sp. n.--- A: Sensillus. B: Prodorsum in dorsal view. C: Rostral teeth. D: Dorsal aspect. E: Notogastral seta. F: Ventral aspect.

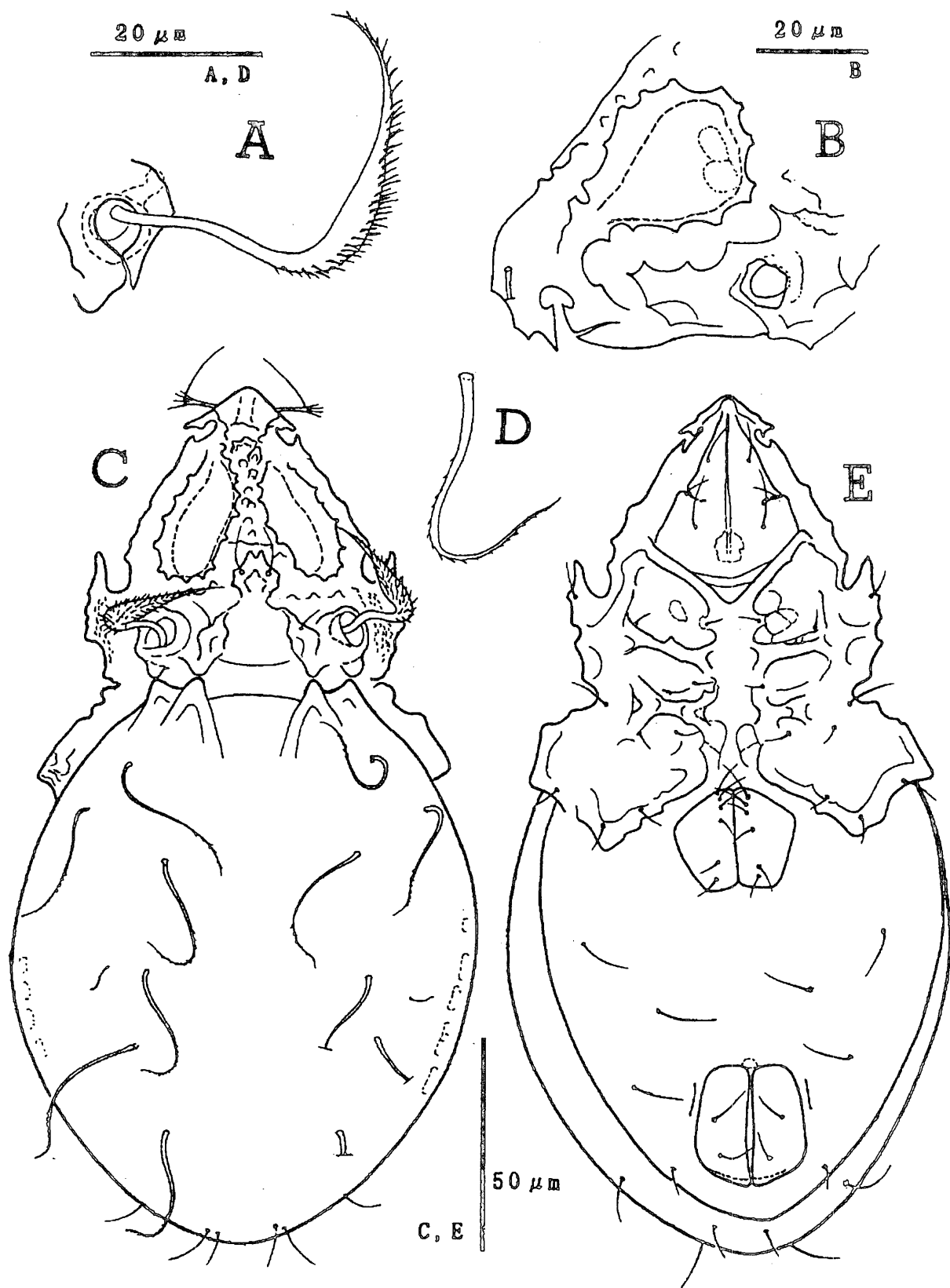


Fig.41: *Suctobelbella ancorhina* sp. n. --- A: Sensillus. B: Prodorsum in lateral view. C: Dorsal aspect. D: Notogastral seta. E: Ventral aspect.

From litter under grove of *Machilus thunbergii*.--- 1 ex. Kubokawa-machi, Kochi-ken. 23-X-1980. S. CHINONE. From litter under grove of *Castanopsis cuspidata*, *Cinnamomum camphora*. --- 1 ex. Saikoji, Hayato-cho, Kagoshima-ken. 30-III-1990. K. ISHII & H. SAKAYORI. From litter under laurel forest. --- 11 exs. Uenohara, Kokubu-shi, Kagoshima-ken. 30-III-1990. K. ISHII & H. SAKAYORI. From litter under laurel forest. --- 1 ex. Tonan Botanical Garden, Okinawa-ken. 5-V-1974. S. CHINONE.

**Measurements:** (in  $\mu\text{m}$ ,  $n=6$ ): Body length 183-195 (av.189), width 100-110 (av.105), L/W 1.8. Length of setae: *le* 15, *c* 31, *lm* 34, *lp* 32.

**Prodorsum:** In dorsal view, rostrum anchor-shaped by deep incisions of both side. In lateral view, rostral teeth look characteristic: 1st tooth triangular, 2nd one lobe-shape, 3rd one acute, followed by a deep incision which spreads basally as a heart-shape. Surface smooth in anterior region of rostrum, while with some irregular short ridges in posterior region. Lamellar knob rather pentagonal in shape with slightly bifurcated front corner. Tectopedial field oval in shape. Some tubercles found between tectopedial fields. Sensillus sickle-shaped; its head tapering at tip, with cilia densely on outer edge.

**Notogaster:** Notogaster oval in shape, about  $1.0\times$  as long as wide. Notogastral condyle *co.nm* triangular; its inner ridge long, reaching the level of seta *c*; *co.nl* short coniform. Nine pairs of long sinuate dorsal setae, barbed at one third of distal part. Posteromarginal setae, *p*<sub>1</sub>, *p*<sub>2</sub> and *h*<sub>1</sub> thin and short. *RLN* of setae: *lm* 29, *lp* 27.

**Ventral aspect:** Epimeral cavity slightly observed. Genital plate about  $1.1\times$  as long as anal plate. Six pairs of genital setae: *g*<sub>1</sub> longest, about  $1.5\times$  as long as *g*<sub>5</sub>, the rest of the setae short and of equal length to one another. Setal formula of epimerata: 3-1-3-3. Relative length of setal intervals:  $ag-ag>ad_2-ad_2>ad_3-ad_3=ad_1-ad_1$ .

**Remarks:** The new species is easily distinguished from the other species by (1) the shape of rostral teeth and incisions, which spread basally as a heart-shape, (2) long sinuate dorsal setae.

***Suctobelbella crispirhina* sp. n.**

[Shiwahana-madodani]

(Fig.42)

**Material examined:** Holotype (NSMT-Ac 11410); Near Lake Mashuko, Teshikaga-cho, Hokkaido. 29-VII-1983. S. CHINONE. From Litter under grove of

*Betula ermani* and *Picea jezoensis*.--- 5 paratypes (NSMT-Ac 11411 to 11415), the same data as the holotype. --- 1 ex. Nakakinenbetsu, Opira-cho, Hokkaido. 3-VII-1983. S. CHINONE. From litter under grove of *Quercus mongolica grosseserrata* and *Betula ermani*. --- 1 ex. Uematsu, Hazaki-machi, Ibaraki-ken. 6-VII-1979. S. CHINONE. From litter under grove of *Pinus thunbergii*. --- 1 ex. Mt. Chaus, 2140m above sea level, Nagano-ken. 9-VIII-1977. S. CHINONE. From litter under grove of *Abies veitchii*. --- 1 ex. Mt. Fuji, 2350m above sea level, Yamanashi-ken. From litter under forest of *Abies mariesii* and *Betula ermani*.

**Measurements:** (in  $\mu\text{m}$ ,  $n=5$ ): Body length 188-214 (av.214), width 105-130 (av.116), L/W 1.8. Length of setae: *le* 15, *c* 29, *lm* 35, *lp* 35.

**Prodorsum:** Rostral tip projected in dorsal view, though concave widely by crushed specimen; bilaterally with a wide rostral lobe. About 3 rostral teeth present: 1st one thick and sharp, 2nd and 3rd ones rather fine and sharp, in holotype specimens 3rd tooth not present on the left side. Rostral region angular and bridge-like, with about 2 short irregular transverse ridges, and densely granulated. The region between tectopedial fields wide, scattering some tubercles and many granules. Tectopedial field rather small, closed forwards. Lamellar knob pentagonal with projecting front corner. Peduncle of sensillus rather long, its head spindle-shaped, with many short bristles on outer side.

**Notogaster:** Notogaster oval in shape, about  $1.1\times$  as long as wide. Notogastral condyles *co.nl* slender coniform, *co.nm* triangular. Nine pairs of dorsal setae: the setae long setiform, gently curved; seta *la* inserted nearer to *c* than to *lm*; seta *lm* reaching beyond the insertion of seta *lp*; setae *p*<sub>1</sub> and *p*<sub>2</sub> short. The crevice of lyrifissure *im* situated lengthwise. *RLN* of setae: *lm* 27, *lp* 27.

**Ventral aspect:** Epimeral cavity slightly developed. Genital plate  $1.1\times$  as long as anal plate. Six pairs of genital setae: 1st pair longer than the rest. The setal formula of epimerata: 3-1-3-3. The setae *4a*, *4c*, *4d* long, about  $2\times$  as long as *3a*. Seta *ag*, *ad*<sub>2</sub> and *ad*<sub>3</sub> the same length as seta *4a*. Relative length of setal intervals:  $ag-ag>ad_2-ad_2>ad_3-ad_3=ad_1-ad_1$ .

**Remarks:** The new species is very similar to *Suctobelbella subcorniger* (FORSSLUND, 1941), but is discriminated from the latter species by the following points, 1) the head of sensillus not slender crescent-shape



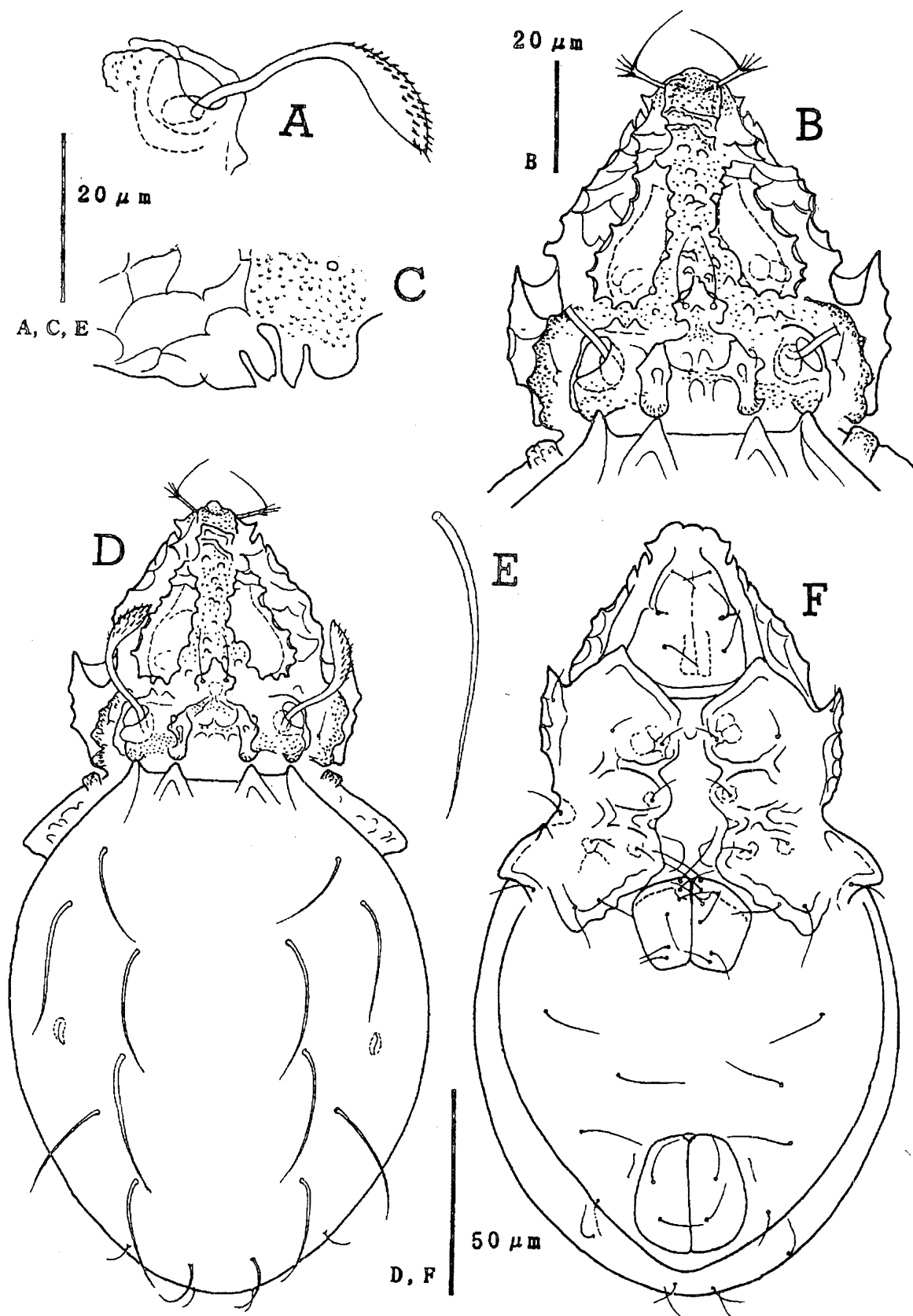


Fig.42: *Suctobelbella crispirhina* sp. n. --- A: Sensillus. B: Prodorsum in dorsal view. C: Rostral teeth. D: Dorsal aspect. E: Notogastral seta. F: Ventral aspect.

as that of the latter, but short spindle-shaped, 2) rostral teeth sharper and more pointed at tip.

***Suctobelbella alpina* sp. n.**

[Miyama-madodani]

(Fig.43)

**Material examined:** Holotype (NSMT-Ac 11416); Near Mt Chaus (altitude 2140m), Yatsugatake, Nagano-ken. 9-VIII-1977. S. CHINONE. From litter under forest of *Abies veitchii*. --- 5 paratypes (NSMT-Ac 11417 to 11421), the same data as the holotype.

**Measurements:** (in  $\mu\text{m}$ ,  $n=5$ ): Body length 180-218 (av.197), width 100-103 (av.102), L/W 1.9. Length of setae: *le* 7, *c* 22, *lm* 27, *lp* 27.

**Prodorsum:** Rostral tip medially concave like a letter U, bilaterally with a large projecting rostral lobe with a truncate tip. Three acute rostral teeth present: 1st one thick, 2nd and 3rd ones slender. Rostral region elevated by 2 longitudinal ribs bilaterally, decorated with many small granules. Between tectopedial fields found also many small granules and some large ones. Tectopedial field elongate oval in shape. Lamellar knob rather pentagonal, pointed anteriorly. Head of sensillus spindle-shaped with 1 or 2 short bristles at tip.

**Notogaster:** Notogaster oval in shape,  $1.1\times$  as long as wide. Notogastral condyles close to each other: *co.nm* triangular, *co.nl* obtuse. Six pairs of long curved, smooth setae and three pairs of fine short setae at posteromarginal position: seta *lm* reaching beyond the insertion of seta *lp*. RLN of setae: *lm* 18, *lp* 24.

**Ventral aspect:** Epimeral cavity not developed. Six pairs of genital setae: 1st pair longest and 2nd pair  $0.6\times$ , the other pairs  $0.3\times$  as long as 1st one. Genital plate about as long as anal plate. Setal formula of epimerata: 3-1-3-3. Relative length of setal intervals:  $ag-ag > ad_2-ad_2 > ad_3-ad_3 > ad_1-ad_1$ .

**Remarks:** The new species stands near to *Suctobelbella hamata* MORITZ, 1970, but is discriminated from the latter by (1) the head of sensillus short spindle-shape, with 1 or 2 bristles at tip, (2) median notogastral alveoles not found, (3) three rostral teeth acute, not obtuse as in the latter species.

***Suctobelbella yezoensis* FUJITA et FUJIKAWA, 1984**

[Ezo-madodani]

(Fig.44)

*Suctobelbella yezoensis* FUJITA et FUJIKAWA, 1984, p.1, fig.7.

New localities from Japan : 5 exs. Near Mt. Chausu, Yatsugatake, 2140m above sea level, Nagano-ken. 8-VIII-1977. S. CHINONE. From litter under forest of *Abies veitchii*. --- 1 ex. Tomikawa, Monbetsu-cho, Hokkaido. 28-VII-1983. S. CHINONE. From litter under grove of *Quercus mongolica grosseserrata*. --- 5 exs. Mt. Kaba, Ibaraki-ken. 27-VI-1986. S. CHINONE. From litter under grove of *Quercus acutissima* and *Q. serrata*. --- 1 ex. the Kashima Shrine, Ibaraki-ken. 28-XI-1982. S. CHINONE. From litter under forest of *Abies firma* and *Cryptomeria japonica*. --- 1 ex. Kakuzaki, Tone-mura, Ibaraki-ken. 27-V-1979. S. CHINONE. From litter under grove of *Pinus densiflora*. --- 5 exs. Tamada, Asahi-mura, Ibaraki-ken. S. CHINONE. From litter under grove of *Pinus thunbergii*. --- 1 ex. Daimyojin, Iwai-shi, Ibaraki-ken. 14-V-1991. S. CHINONE. From litter under grove of *Castanopsis cuspidata* and *Carpinus tschonoskii*. --- 1 ex. Yoseki, Matsuo-mura, Iwate-ken. 9-VIII-1973. S. CHINONE. From litter under grove of *Abies firma*. --- 1 ex. Masaki, Taro-cho, Iwate-ken. 8-VIII-1973. S. CHINONE. From litter under grove of *Pinus densiflora*. --- 3 exs. Mt. Kengamine, Yaita-shi, Tochigi-ken. 12-XI-1994. From litter under grove of *Pinus bicolor*. --- 2 exs. Tashiro-rindo, Kuriyama-mura, Tochigi-ken. 24-IX-1995. From litter under grove of *Fagus crenata*, *Quercus mongolica grosseserrata* and *Kalopanax pictus*. --- 1 ex. Onuma Park, Shiobara-machi, Tochigi-ken. 13-XI-1994. From litter under grove of *Quercus mongolica grosseserrata*, *Aesculus turbinata* and *Fagus crenata*. --- 2 exs. Minamikata, Kuroha-machi, Tochigi-ken. 15-X-1994. From litter under grove of *Castanea crenata*, *Q. mongolica grosseserrata*, *Fagus crenata*, *Abies firma* and *Pinus densiflora*. --- 1 ex. Mt. Adatara, Hukushima-ken. 30-VII-1985. From litter under grove of *Pinus pumila*. --- 3 exs. Mt. Kiyosumi, Chiba-ken. 18-XII-1983. S. CHINONE. From litter under forest of *Abies firma* and *Cyclobalanopsis glauca*. --- 2 exs. Kurobe, Toyama-ken. 3-III-1998. Y. HIRAUCHI. From litter under forest of *Cryptomeria japonica*. --- 2 exs. Uotsu-shi, Toyama-ken. 25-X-1997. Y. HIRAUCHI. From litter under forest of *Cryptomeria japonica*. --- 3 exs. Bijodaira, Toyama-ken. 10-V-1998. Y. HIRAUCHI. From litter under forest of *Fagus crenata*. --- 1 ex. Murododaira (altitude 2342m), Tateyama-machi, Toyama-ken. 26-VII-1997.

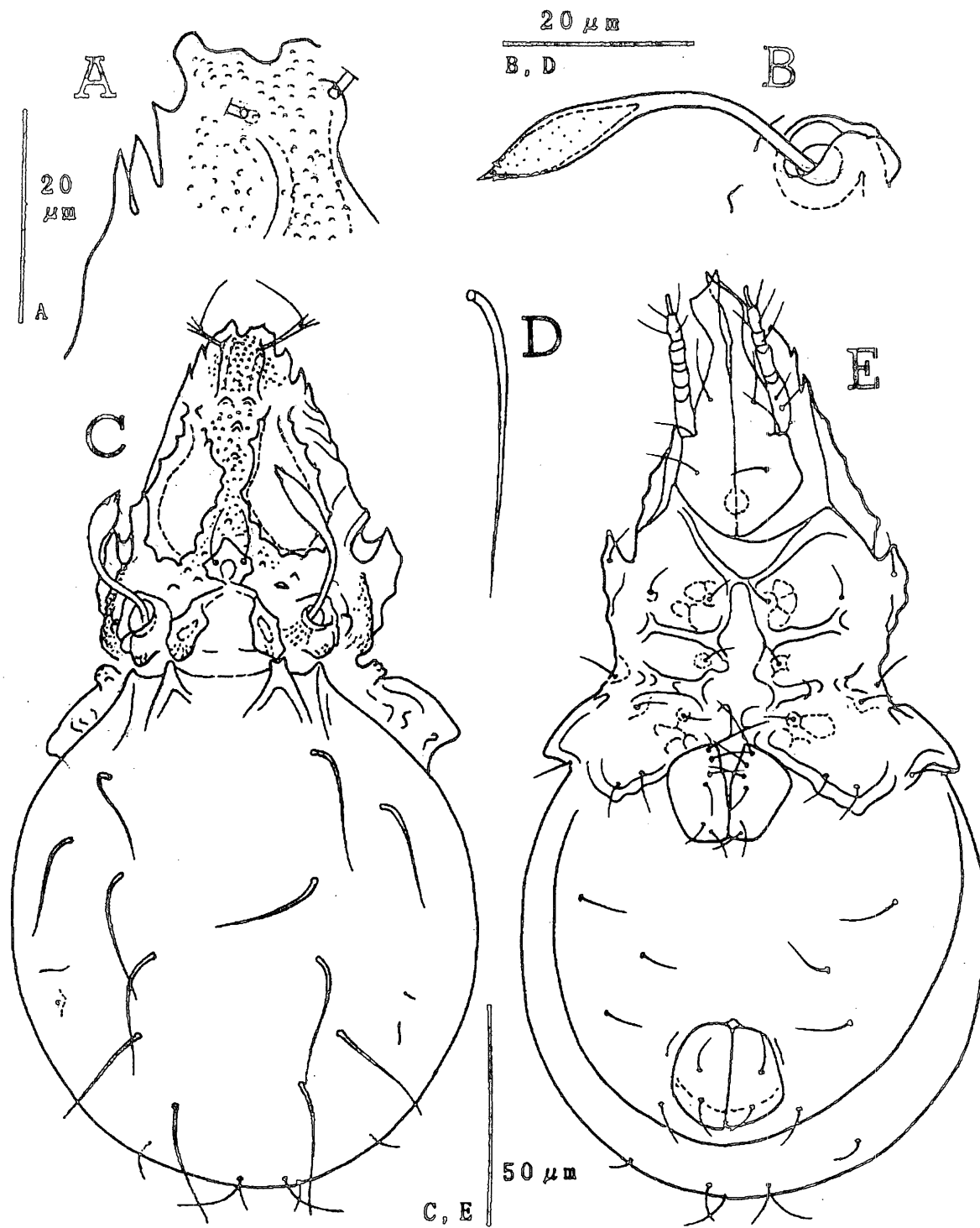


Fig.43: *Suctobelbella alpina* sp. n.--- A: Rostral teeth. B: Sensillus. C: Dorsal aspect. D: Notogastral seta. E: Ventral aspect.

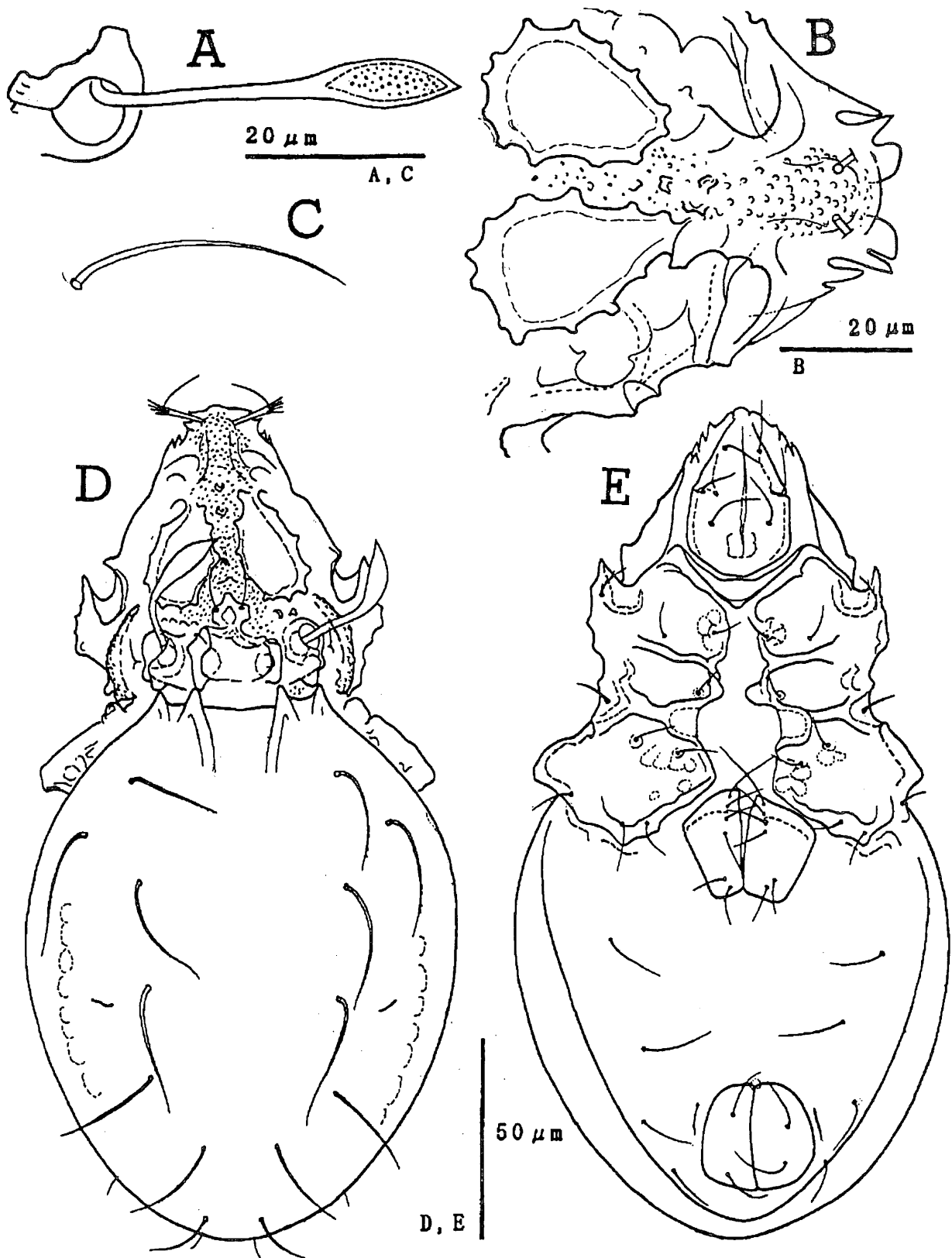


Fig.44: *Suctobelbella yezoensis* FUJITA et FUJIKAWA, 1987--- A: Sensillus. B: Prodorsum in dorsal view. C: Notogastral seta. D: Dorsal aspect. E: Ventral aspect.

Y. HIRAUCHI.--- 1 ex. Mt. Fuji, Yamanashi-ken, 2350m above sea level. From litter under grove of *Abies mariesii* and *Betula ermani*. --- 1 ex. Mt. Daisen, Tottori-ken. 25-III-1972. S. CHINONE. From moss material. --- 1 ex. Mt. Sanbe, Shimane-ken. 26-III-1972. S. CHINONE. From litter under forest of *Larix leptolepis*. --- 11 exs. Tsuwano-cho, Shimane-ken. 28-III-1972. S. CHINONE. From litter under grove of *Pinus densiflora*. --- 1 ex. Ogura, Beppu-shi, Oita-ken. 29-III-1990. T. USHIRODA & H. SAKAYORI. From litter under laurel forest. --- 2 exs. Mt. Turumidake, Beppu-shi, Oita-ken. 29-III-1990. T. USHIRODA & H. SAKAYORI. From litter under deciduous broad-leaved forest. --- 1 ex. The Saiko Temple, Hayato-cho, Kagoshima-ken. 30-III-1990. K. ISHII & H. SAKAYORI. From litter under laurel forest. --- 3 exs. Kirishima-cho, Kagoshima-ken. 31-III-1990. K. ISHII & H. SAKAYORI. From litter under grove of *Castanopsis acuta*. --- 1 ex. Makizono-cho, Kagoshima-ken. 31-III-1990. K. ISHII & H. SAKAYORI. From litter under laurel forest including *Abies firma* and *Pinus densiflora*.

**Measurements:** (in  $\mu\text{m}$ ,  $n=5$ ): Body length 190-228 (av.218), width 95-114 (av.110), L/W 2.0. Length of setae: *le* 14, *c* 26, *lm* 29, *lp* 30.

**Prodorsum:** Rostral tip rounded in dorsal view, but concave widely by crushed specimen. Rostral tip truncate or slightly concave. About 3 or 4 acute teeth present: 1st one rather thick, 2nd one slender, a deep incision between them, 3rd and 4th ones short. Rostral region with bridge-like swelling and densely granulated. Median surface of prodorsum with some tubercles and many granules. Tectopedial field small oval in shape, with closed frontal border. Lamellar knob hexagonal or pentagonal. Peduncle of sensillus long and the head short fusiform; the peduncle 1.5-2.0 $\times$  as long as the head.

**Notogaster:** Notogaster oval in shape, 1.3 $\times$  as long as wide. Notogastral condyle *co.nm* triangular, its inner keel extending backwards at the level of setae *ta* and *co.nl* short. Nine pairs of dorsal setae: the setae rather long, gently curved, some of which slightly barbed; seta *lm* reaching beyond the insertion of seta *lp*. *RLN* of setae: *lm* 21, *lp* 21.

**Ventral aspect:** Right and left apodemes removed from each other; epimeral cavity large. Epimeral seta *1c* thick and ciliate. Setal formula of epimerata: 3-1-3-3. Genital plate 1.1 $\times$  as long as anal plate. Six pairs of genital setae: foremost pair longer than the rest pairs. Relative length of

setal intervals:  $ag-ag > ad_2-ad_2 > ad_3-ad_3 > ad_1-ad_1$ .

**Remarks:** The specimens here treated, well agree with the holotype specimens, but slightly differ from the original description in (1) dorsal setae more longer, (2) head of sensillus with acute tip, (3) shape of rostral teeth. Some figures here are presented to supplement the original description.

**Distribution:** Japan.

### *Suctobelbella spirochaeta* MAHUNKA, 1983

[Kunegetawashi-madodani]

(Fig.45)

*Suctobelbella spirochaeta* MAHUNKA, 1983, p. 425-427, Figs. 84-88.

**Material examined:** 1 ex.; Shimasu, Ushibori-machi, Ibaraki-ken. 27-V-1979. S. CHINONE. From litter under grove of *Quercus acutissima*. --- 3 exs.: Narage, Ono-mura, Ibaraki-ken. 6-VII-1979. S. CHINONE. From litter under grove of *Pinus densiflora*. --- 1 ex.: Tamada, Asahi-mura, Ibaraki-ken. 9-V-1979. S. CHINONE. From litter under grove of *Pinus thunbergii*. --- 5 exs.: Uematsu, Hazaki-machi, Ibaraki-ken. S. CHINONE. From litter under grove of *Pinus thunbergii*. --- 1 ex.: Mt. Kaba, Ibaraki-ken. S. CHINONE. 27-VI-1986. From litter under grove of *Quercus acutissima* and *Q. serrata*. --- 2 exs.: Mt. Hanakame, Ibaraki-ken. 23-VIII-1984. S. CHINONE. From litter under deciduous broad-leaved forest. --- 1 ex.: Mt. Yamizo, Ibaraki-ken. 23-VIII-1993. S. CHINONE. From litter under forest of *Fagus crenata* and *Abies firma*. --- 1 ex.: Mt. Kiyosumi, Chiba-ken. 18-XII-1983. S. CHINONE. From litter under grove of *Cyclobalanopsis glauca*. --- 1 ex.: Yuhoinone, Toyama-ken. 1-VII-1997. Y. HIRAUCHI.

**Measurements:** (in  $\mu\text{m}$ ,  $n=5$ ): Body length 185-225 (av.210), width 120-140 (av.128), L/W 1.6. Length of setae (av.): *le* 13, *c* 38, *lm* 37, *lp* 40.

**Prodorsum:** Rostrum medially concave in ventral view, bilaterally with a truncate lobe each. About 3 rostral teeth: 1st one long and thick, 2nd one sharp, a deep incision between them, 3rd one short and thick. Rostral region with bridge-like swelling, and densely granulated. The region between tectopedial fields and around lamellar knob with some large tubercles or short ridges. Tectopedial field medium size, rather triangular. Lamellar knob with about 5 corners pointed. Head of sensillus spindle-shaped, short and swollen, with many bristles of different length on outer edge; it seems to be clavate from

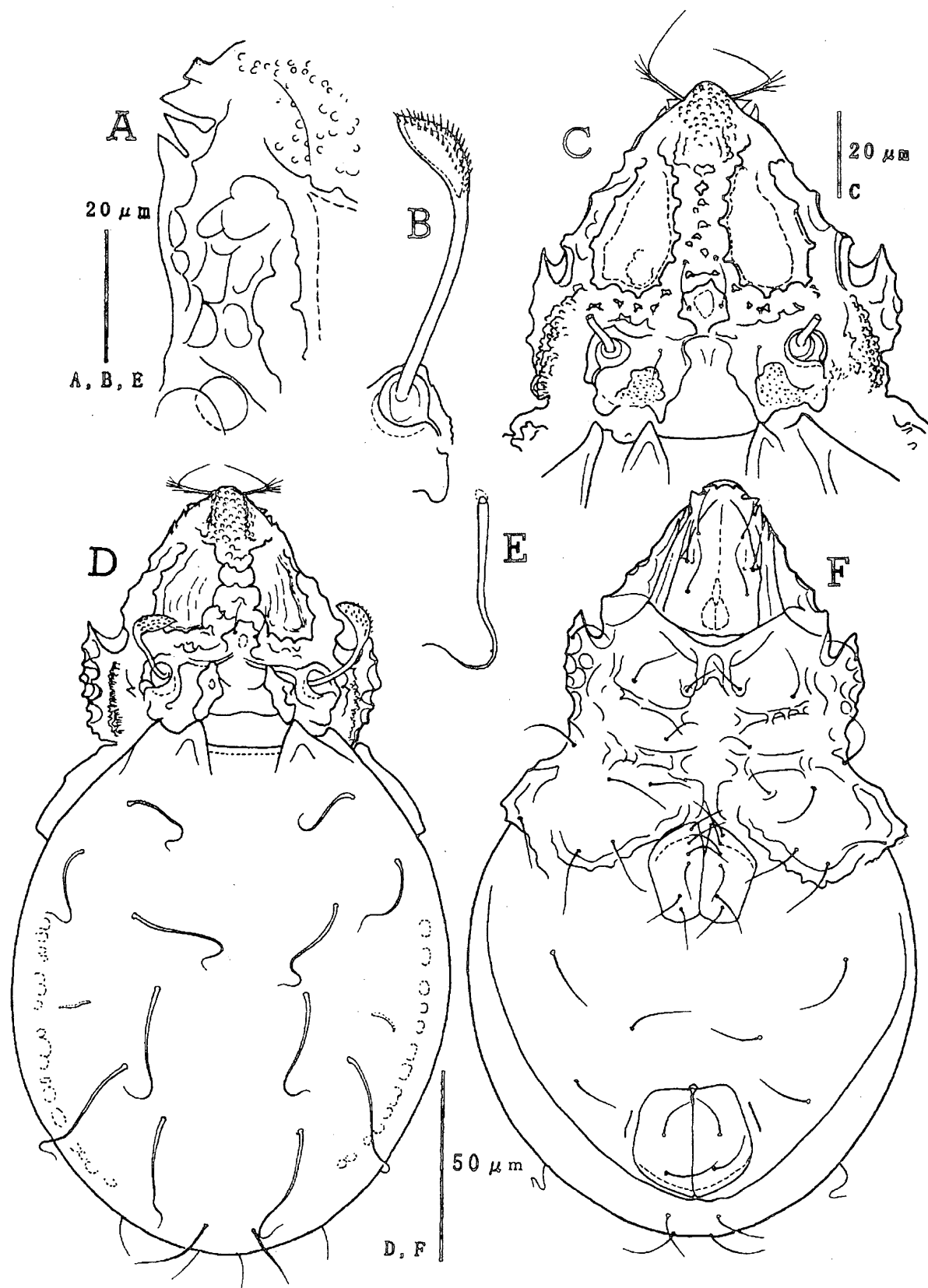


Fig.45: *Suctobelbella spirochaeta* MAHUNKA, 1983--- A: Rostrum in lateral view. B: Sensillus. C: Prodorsum in dorsal view. D: Dorsal aspect. E: Notogastral seta. F: Ventral aspect.

other glance.

**Notogaster:** Notogaster oval in shape, about  $1.0\times$  as long as wide. Notogastral condyles closed to each other: *co.nm* triangular, *co.nl* small. Notogaster with 6 pairs of rather long smooth setae sinuate at distal end and 3 pairs of short smooth posteromarginal setae. *RLN* of setae: *lm* 29, *lp* 31.

**Ventral aspect:** Six pairs of genital setae; *g*<sub>1</sub> long,  $1.3\times$  as long as the rest. Epimeral setae rather long: 4a about as long as *ag*. Setal formula of epimerata: 3-1-3-3. Genital plate slightly smaller than the anal plate. Relative length of setal intervals:  $ag-ag > ad_2-ad_2 > ad_1-ad_1 > ad_3-ad_3$ .

**Remarks:** The Japanese specimens are well in accord with the original description of *Suctobelbella spirochaeta* from Tanzania by MAHUNKA (1983), but slightly differ in the following points, (1) rostral lobe truncate, not pointed at tip, (2) the head of sensillus spindle-shaped, short and swollen, (3) the posterior rostral region between tectopedial fields with some large tubercles or short ridges, (4) small body size.

**Distribution:** Tanzania, the eastern part of the Ethiopian region, and Japan.

*Suctobelbella variosetosa* (HAMMER, 1961) comb. n.  
[Fusagetawashi-madodani]  
(Fig.46)

*Suctobelba variosetosa* HAMMER, 1961, p.43-44, Fig.35.

*Discosuctobelba variosetosa* (HAMMER, 1961): HAMMER, 1979, p.35-37, Fig.59-60.

**Material examined:** 4 exs. Mt. Hanakame, Daigo-machi, Ibaraki-ken. 23-VIII-1984. S. CHINONE. From litter under deciduous broad-leaved forest. --- 1 exs. Kodaka, Aso-machi, Ibaraki-ken. 6-VII-1979. S. CHINONE. From litter under grove of *Pinus densiflora*. --- 1 exs. Saikouji, Hayato-cho, Kagoshima-ken. 30-III-1990. K. ISHII & H. SAKAYORI. From litter under laurel forest.

**Measurements:** (in  $\mu\text{m}$ ,  $n=5$ ): Body length 200-250 (av.233), width 115-140 (av.131), L/W 1.8. Length of setae (av.): *le* 12, *c* 12, *la* 29, *lp* 29.

**Prodorsum:** Rostrum rounded. About 4 rostral teeth: 1st one short, acute, turning downwards, 2nd one large and triangular between them a deep incision, 3rd and 4th ones thick and turning forwards. Front rostral region smooth or slightly granulated. Posterior rostral region and the area between tectopedial fields wide and with short

ridges as mesh-like patterns. Tectopedial field narrow. Lamellar knob with about 5 corners. The head of sensillus disk-shaped with short spines on outer edge.

**Notogaster:** Notogaster oval in shape,  $1.1\times$  as long as wide. Notogastral condyles developed; *co.nl* conical at tip, *co.nm* triangular, they are connected with each other by frontal border; their basal parts extending backwards. Nine pairs of dorsal setae: one pair (seta *c*) short and fine, originating inner side of *co.nm*; 5 pairs (setae *la*, *lm*, *lp*, *h*<sub>1</sub> and *h*<sub>2</sub>) thick and its distal half slender fusiform with cilia on outer side; the 3 pairs (setae *h*<sub>1</sub>, *p*<sub>1</sub> and *p*<sub>2</sub>) minute at posteromarginal position. *RLN* of setae: *lm* 20, *lp* 20.

**Ventral aspect:** Setal formula of epimerata: 3-1-3-3. Epimeral setae rather long and about equal to the other ventral setae. Anal plate about as long as genital plate. Sometimes, short triangular teeth found on anal plate, just in front of 1st anal setae. Relative length of setal intervals:  $ag-ag > ad_2-ad_2 > ad_3-ad_3 = ad_1-ad_1$ .

**Remarks:** The Japanese specimens well accord with the original description by (1) the head of sensillus disk-shaped, (2) the wide and mesh-like patterns between tectopedial fields, (3) the shape of notogastral condyles and most dorsal setae.

**Distribution:** Indonesia (Java), Peru, and Japan.

*Suctobelbella reticulata* sp. n.  
[Amimetawashi-madodani]  
(Fig.47)

**Material examined:** Holotype (NSMT-Ac 11422); Mt. Adataru, Fukushima-ken. 30-VII-1985. S. CHINONE. From litter under grove of *Pinus pumila*. --- 4 paratypes (NSMT-Ac 11423 to 11426), the same data as the holotype. --- 1 ex. Mt. Hanakame, Daigo-machi, Ibaraki-ken. 15-V-1994. S. CHINONE. From litter under forest of *Cryptomeria japonica*. --- 2 exs. Narake, Ono-mura, Ibaraki-ken. 6-VII-1979. S. CHINONE. From litter under grove of *Pinus densiflora*. --- 2 exs. Daimyojin, Iwai-shi, Ibaraki-ken. 14-V-1991. S. CHINONE. From under grove of *Castanopsis cuspidata* and *Carpinus tschonoskii*. --- 2 exs. Mt. Kiyosumi, Chiba-ken. 18-XII-1983. S. CHINONE. From litter under forest of *Abies firma*. --- 3 exs. Mt. Sanbe, Shimane-ken. 26-III-1972. S. CHINONE. From litter under grove of *Cryptomeria japonica*. --- 7 exs. Yashima, Takamatsu-shi, Kagawa-ken. 24-X-1980. S. CHINONE. From litter under grove of *Pinus densiflora*.

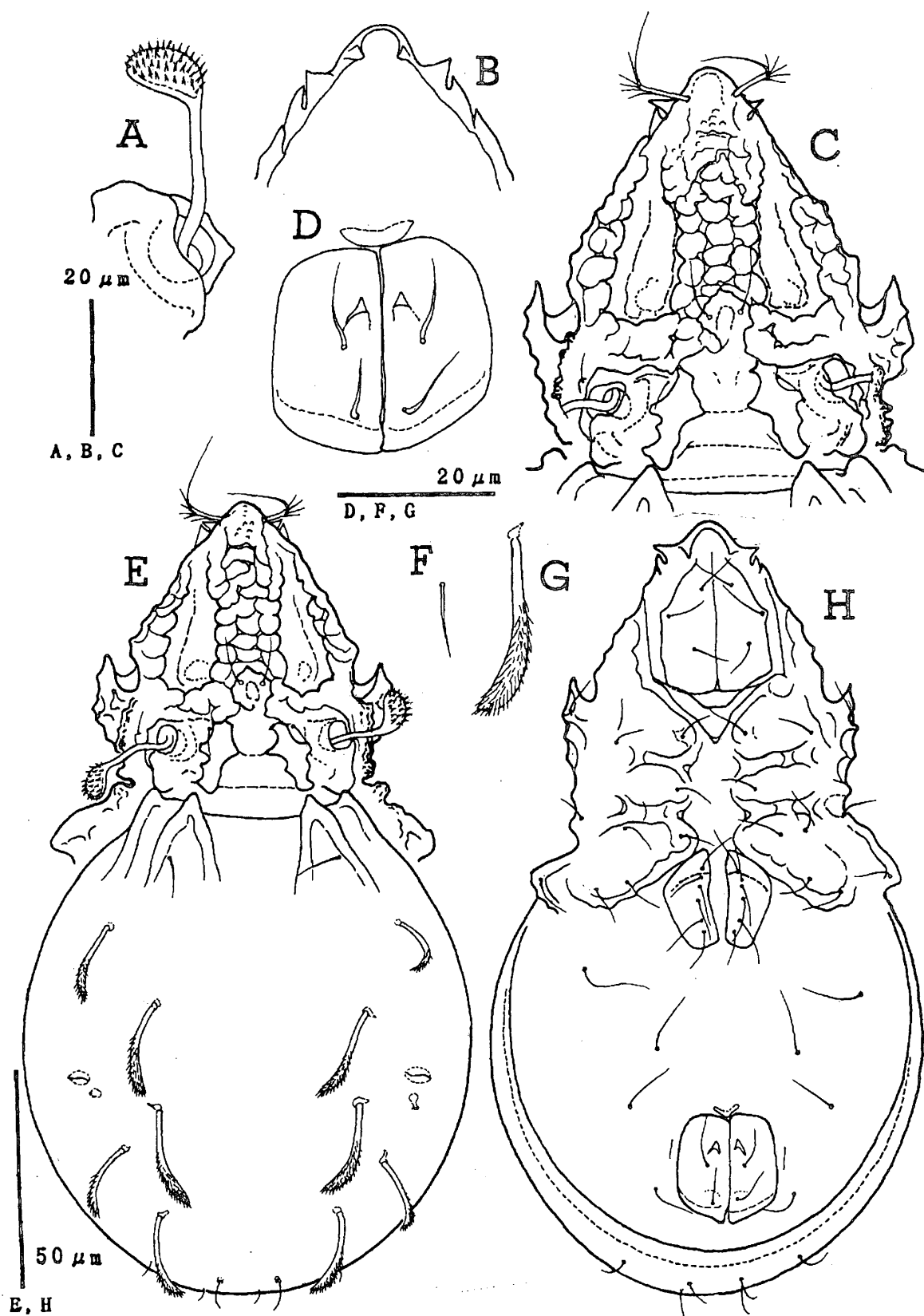


Fig.46: *Suctobelbella varicosetosa* (HAMMER, 1961) comb. n.--- A: Sensillus. B: Rostral teeth. C: Prodorsum in dorsal view. D: Anal plate. E: Dorsal aspect. F: Notogastral seta c. G: Notogastral seta *lm*. H: Ventral aspect.



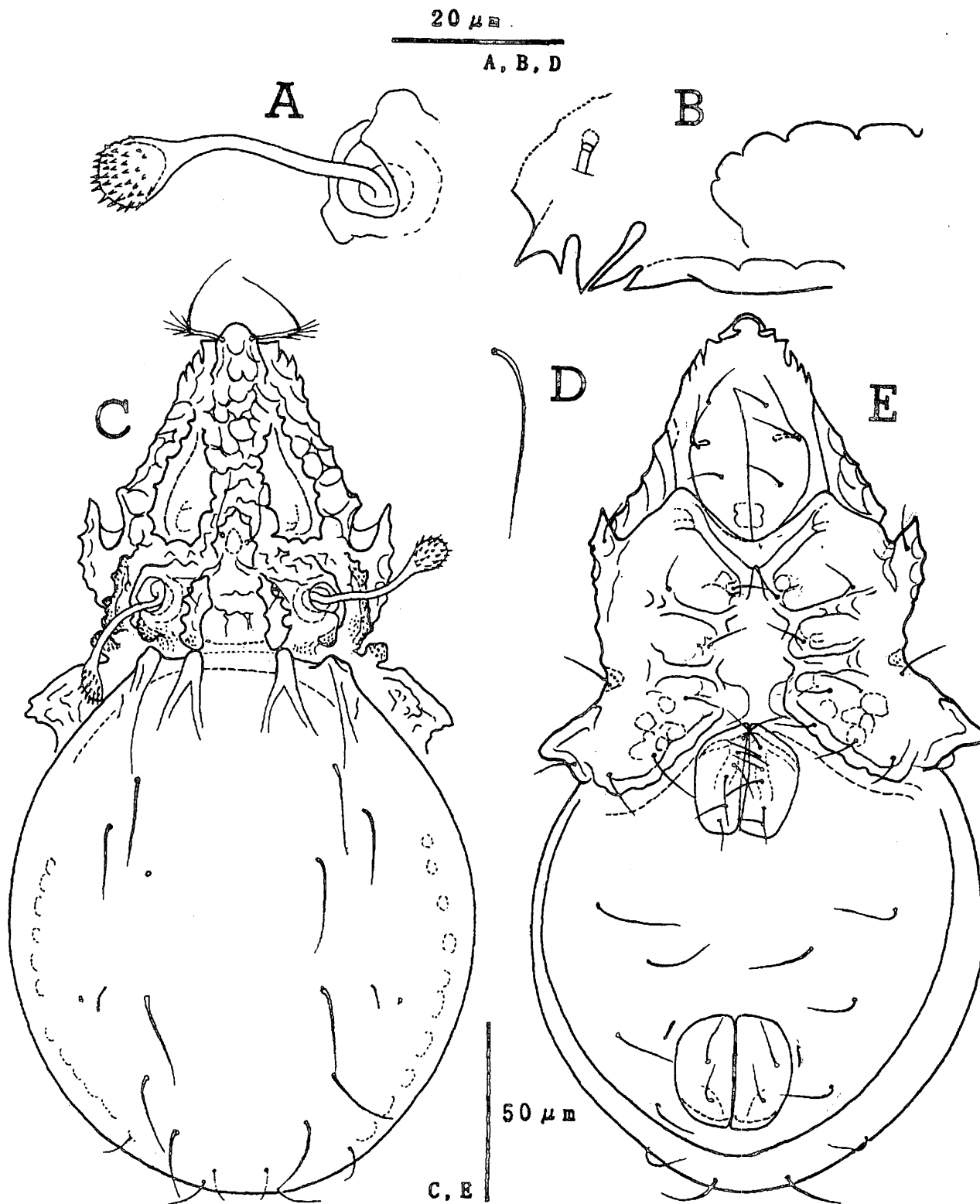


Fig.47: *Suctobelbella reticulata* sp. n. --- A: Sensillus. B: Rostrum in lateral view. C: Dorsal aspect. D: Notogastral seta. E: Ventral aspect.

**Measurements:** (in  $\mu\text{m}$ ,  $n=5$ ): Body length 230-240 (av.234), width 130-135 (av.131), L/W 1.8. Length of setae (av.): *le* 15, *c* 23, *lm* 22, *lp* 22.

**Prodorsum:** Rostrum rounded in dorsal view, but by crushed specimen it concaved medially, bilaterally with a forked rostral lobe. About 3 sharp rostral teeth present: 1st one thick, 2nd one slender, a deep incision between them, 3rd one short. Prodorsal surface except for tectopedial fields remarkably sculptured with mesh-like patterns. The tectopedial fields rather small, triangular and remote from each other. Lamellar knob large with about 6 pointed corners. Peduncle of sensillus long, the head short spindle-shaped with many bristles on outer edge.

**Notogaster:** Notogaster oval in shape,  $1.1\times$  as long as wide. Notogastral condyles developed: *co.nl* not acute at tip, rather rugged, extending a fine ridge from its inner side posteriorly at the level of the insertion of *c*; *co.nm* rounded with ridge forked posteriad. Nine pairs of notogastral setae: the setae moderately long, setiform, bending at basal portion; dorsal setae being arranged lengthwise, therefore, seta *la* inserted inside. *RLN* of setae: *lm* 15, *lp* 15.

**Ventral aspect:** Epimeral cavity not developed. Epimeral setae rather long, setal formula of epimerata: 3-1-3-3. Six pairs of genital setae. Genital plate  $1.1\times$  as long as anal plate. Relative length of setal intervals:  $ag-ag > ad_2-ad_2 > ad_1-ad_1 = ad_3-ad_3$ .

**Remarks:** The new species stands near to *Suctobelbella acutodentata* (HAMMER, 1979), comb.n. It is, however, discriminated from the latter by the shape of sensillus: head smooth in *S. acutodentata*, but spinose in the new species. The new species is well characterized by the following points: (1) mesh-like patterns of prodorsum, (2) the shape of sensillus.

*Suctobelbella longidentata* sp. n.

[Kiba-madodani]

(Fig.48)

**Material examined:** Holotype (NSMT-Ac 11427); Mt. Kiyosumi, Chiba-ken. 18-XII-1983. S. CHINONE. From litter under forest of *Abies firma*. --- 3 paratypes (NSMT-Ac 11428 to 11430), the same data as the holotype. --- 5 exs. From litter under forest of *Cyclobalanopsis glauca*, the other data same to the holotype. --- 3 exs. Tamada, Asahi-mura, Ibaraki-ken. 9-V-1979. S. CHINONE. From litter under grove of *Pinus*

*thunbergii*. --- 1 ex. Mt. Nishikanasa, Kanasago-mura, Ibaraki-ken. 24-VIII-1984. S. CHINONE. From litter under grove of *Castanopsis cuspidata*. --- 1 ex. Mt. Kaba, Ibaraki-ken. 27-V-1986. S. CHINONE. From litter under grove of *Quercus acutissima* and *C. serrata*. --- 1 ex. Mt. Tatsuwake, Jyuo-machi, Ibaraki-ken. 19-VIII-1982. S. CHINONE. From litter under grove of *Quercus mongolica grosseserrata*. --- 6 exs. Mt. Hanakame, Daigo-machi, Ibaraki-ken. 23-VIII-1984. S. CHINONE. From litter under forest of *Fagus crenata* and *Abies firma*. --- 2 exs. Mt. Yamizo, Ibaraki-ken, 24-VII-1984 (1 ex) and 13-V-1986 (1 ex). From litter under forest of *Fagus crenata*. --- 3 exs. Okami, Satomi-mura, Ibaraki-ken. 18-VIII-1982. S. CHINONE. From litter under grove of *Cryptomeria japonica* and *Quercus acutissima*. --- 1 ex. The Kashima Shrine, Ibaraki-ken. 28-XI-1982. S. CHINONE. From litter under forest of *Abies firma* and *Cryptomeria japonica*. --- 1 ex. Cave Ryusendo, Iwate-ken. 8-VIII-1973. S. CHINONE. From litter under grove of *Q. mongolica grosseserrata* and maple tree. --- 1 ex. Mt. Chaus, Yatsugakake, Nagano-ken. 9-VIII-1977. S. CHINONE. From litter under grove of *Abies veitchii*. --- 2 exs. Tashiro-rindo, Kuriyama-mura, Tochigi-ken. 24-IX-1995. From litter under grove of *Fagus crenata* and *Quercus mongolica grosseserrata*. --- 1 ex. Kuroiso-shi, Tochigi-ken. 3-XI-1994. From litter under forest of *Q. mongolica grosseserrata* and *Betula ermani*. --- 1 ex. Mt. Hiei, Kyoto-fu. 25-IV-1973. S. CHINONE. From litter under forest of *Cryptomeria japonica*. --- 2 exs. Tsuwano-cho, Shimane-ken. 28-III-1972. S. CHINONE. From litter under grove of *Pinus densiflora*. --- 2 exs. Mt. Sanbe, Shimane-ken. 26-III-1972. S. CHINONE. From litter under grove of *Larix leptolepis*. --- 1 ex. The Matsuyama Castle, Matsuyama-shi, Ehime-ken. 19-X-1980. S. CHINONE. From litter under grove of *Castanopsis cuspidata* and oak tree. --- 5 exs. Kubokawa-cho, Kochi-ken. 23-X-1980. S. CHINONE. From litter under grove of *Castanopsis cuspidata*, *C. acuta* and *Cinnamomum camphora*. --- 2 exs. Yashima, Takamatsu-shi, Kagawa-ken. 24-X-1980. S. CHINONE. From litter under grove of *Pinus densiflora*. --- 2 exs. Uenohara, Kokubu-shi, Kagoshima-ken. 30-III-1990. K. ISHII & H. SAKAYORI. From litter under laurel forest.

**Measurements:** (in  $\mu\text{m}$ ,  $n=5$ ): Body length 210-230 (av.222), width 102-135 (av. 123), L/W 1.8. Length of setae (av.): *le* 19, *c* 30, *lm* 33, *lp* 31.

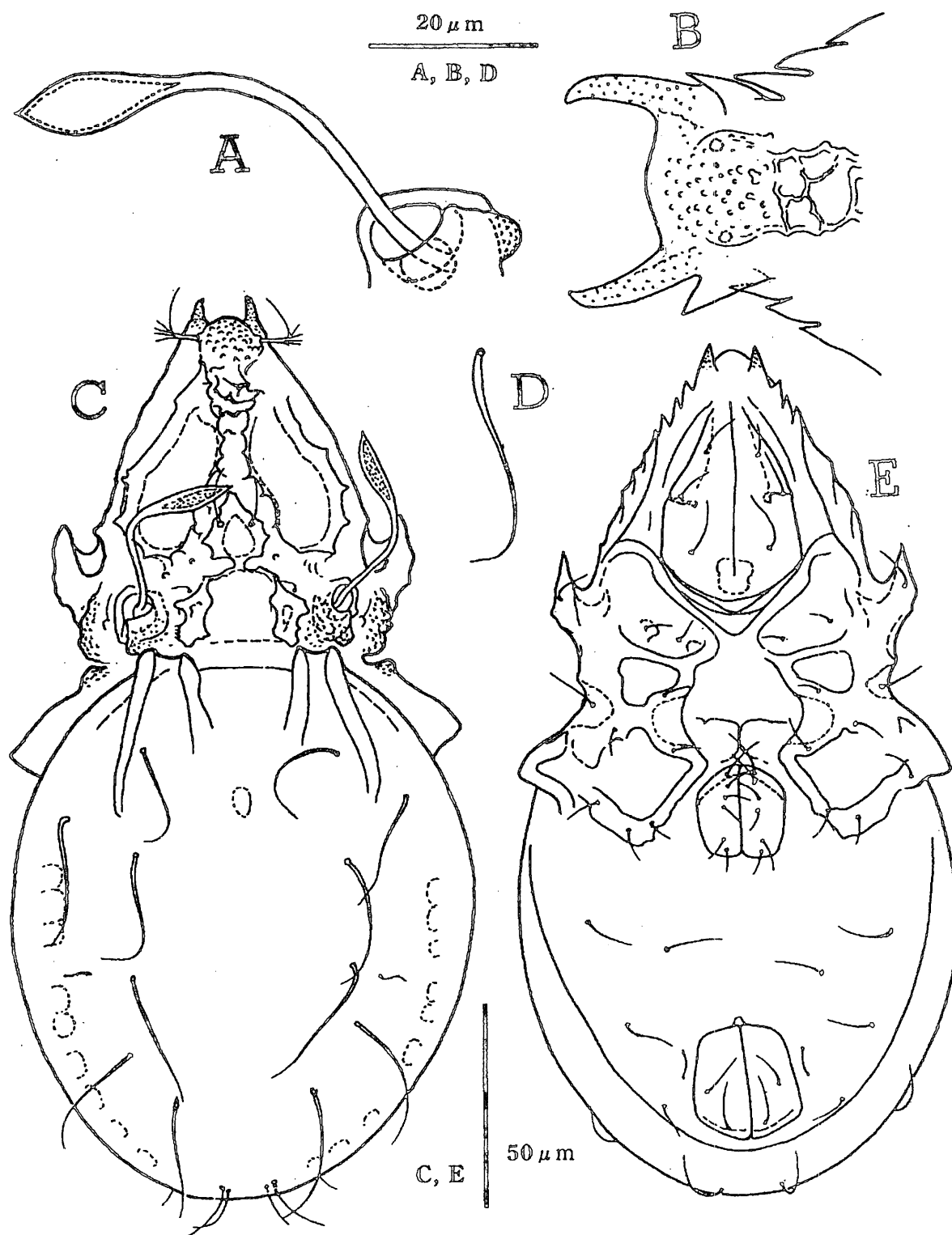


Fig.48: *Suctobelbella longidentata* sp. n.--- A: Sensillus. B: Rostrum in dorsal view. C: Dorsal aspect. D: Notogastral seta. E: Ventral aspect.

**Prodorsum:** Rostrum with rounded tip and granulated densely. About 4 rostral teeth: 1st one very large and thick,

projecting forwards like a tusk and granulated densely, 2nd to 4th teeth short and pointed at tip. Posterior rostral

region ornamented with some short irregular ridges. Tectopedial field elongate, with its anterior end opened. Lamellar knob large, polygonal, projecting antero. Head of sensillus slender fusiform.

**Notogaster:** Notogaster oval in shape, about 1.1× as long as wide. Notogastral condyles long and slender: *co.nm* and *co.nl* closed to each other and connected by frontal border, *co.nl* longer than *co.nm* and extending backwards at the level of seta *la*. At the level of seta *la* a vaguely delimited oval alveolus found medially. *RLN* of setae: *lm* 25, *lp* 23.

**Ventral aspect:** Right and left apodemes removed far from each other posteriorly. Epimeral cavity large. Setal formula of epimerata: 3-1-3-3. Six pairs of genital setae: 1st pair longer than the rest pairs. Genital plate 1.2× as long as anal plate. Relative length of setal intervals:  $ag-ag > ad_2-ad_2 > ad_3-ad_3 = ad_1-ad_1$ .

**Remarks:** The new species stands near to *Suctobelbella perarmata* (MAHUNKA, 1978) comb. n. and *S. andrassyi* (BALOGH et MAHUNKA, 1981) comb. n. It is, however, distinguished from them by, (1) the shape of rostral region round and granulated, (2) the head of sensillus slender fusiform, not shortly clavate as the latter two species, (3) notogastral condyles longer than the other species, (4) a large epimeral cavity on ventral surface.

#### Type B ( 5 pairs of genital setae )

#### Key to the Japanese species of the type B in genus *Suctobelbella*

- 1(2) The number of notogastral setae 8 pairs -----  
----- *S. claviseta nipponica* FUJIKAWA, 1976
- 2(1) The number of notogastral setae 9 pairs ----- 3
- 3(16) Head of sensillus semilunar in shape ----- 4
- 4(15) Notogastral surface with no excrescences ----- 5
- 5(10) Some notogastral setae feathered or leaf-shaped or lanceolate ----- 6
- 6(7) Some notogastral setae feathered -----  
----- *S. plumosa* sp.n.
- 7(6) Some notogastral setae leaf-shaped or lanceolate ----- 8
- 8(9) Some notogastral setae leaf-shaped with serrate margin ----- *S. frondosa* AOKI et FUKUYAMA, 1976
- 9(8) Six or seven notogastral setae lanceolate and not barbed ----- *S. hastata* PANKOW, 1986

- 10(5) Notogastral setae glabrous ----- 11
- 11(12) Notogastral setae thick and long: seta *lm* reaching beyond the insertion of seta *lp*. Body small -----  
----- *S. ibarakiensis* sp.n.
- 12(11) Notogastral setae short: seta *lm* not reaching seta *lp* ----- 13
- 13(14) Body small (160-172μm). Notogastral setae rather thick ----- *S. pumila* sp.n.
- 14(13) Body medium-size (198-220μm), rostral surface with complicated network-patterns. Notogastral setae thin ----- *S. reticulatoides* sp.n.
- 15(4) Notogastral surface with excrescences -----  
----- *S. verrucosa* sp.n.
- 16(3) Head of sensillus not semilunar in shape ----- 17
- 17(18) Sensillar head long and slender fusiform -----  
----- *S. tumida* sp.n.
- 18(17) Sensillar head clavate. Notogastral condyle *co.nl* long and keel-like ----- *S. tamurai* sp.n.

#### *Suctobelbella plumosa* sp. n.

[Umo-chibimadodani]

(Fig.49)

**Material examined:** Holotype (NSMT-Ac 11431); Mt. Yamizo, Ibaraki-ken. 28-IX-1981. S. CHINONE. From litter under forest of *Fagus crenata* and *Quercus mongolica grosseserrata*. --- 5 paratypes (NSMT-Ac 11432 to 11436), the same data as the holotype. --- 14 exs. Mt. Hanakame, Daigo-machi, Ibaraki-ken. 23-VIII-1984. S. CHINONE. From litter under grove of *Fagus crenata* and *Abies firma*. --- 2 exs. The Kashima Shrine, Ibaraki-ken. 1 sp.; 28-XI-1982, 1 sp.; 19-VIII-1981. S. CHINONE. From litter under forest of *Cryptomeria japonica* and *Abies firma*. --- 1 ex. Shimasu, Ushibori-machi, Ibaraki-ken. 27-V-1979. S. CHINONE. From litter under grove of *Quercus acutissima*. --- 1 ex. Okami, Satomi-mura, Ibaraki-ken. 18-VIII-1982. S. CHINONE. From litter under grove of *Cryptomeria japonica* and *Q. acutissima*. --- 1 ex. The Omotari Shrine, Toride-shi, Ibaraki-ken. 27-V-1979. S. CHINONE. From litter under grove of *Castanopsis cuspidata* and *Pinus densiflora*. --- 1 ex. Umakake, Mifo-mura, Ibaraki-ken. 6-I-1985. S. CHINONE. From litter under grove of *Castanopsis cuspidata* and *Machilus thunbergii*. --- 3 exs. Mt. Nishikanasa, Kanasago-mura, Ibaraki-ken. 24-VIII-1984. S. CHINONE. From litter under grove of *Castanopsis cuspidata* and *C. myrsinaefolia*. --- 1 ex. Tamada, Asahi-mura, Ibaraki-ken. S. CHINONE.

From litter under grove of *Pinus thunbergii*. --- 8 exs. Mt. Kaba, Ibaraki-ken. 27-X-1986. S. CHINONE. From litter under grove of *Quercus acutissima* and *Q. serrata*. --- 1 ex. Mt. Kiyosumi, Chiba-ken. 18-XII-1983. S. CHINONE. From litter under forest of *Abies firma*. --- 4 exs. Minakata, Kuroha-machi, Tochigi-ken. 15-X-1994. From litter under grove of *Quercus mongolica grosseserrata* and *Fagus crenata*. --- 4 exs. Mt. Kengamine, Yaita-shi, Tochigi-ken. 12-XI-1994. From litter under grove of *Picea bicolor*. --- 3 exs. Mugimeshizaka, Numahara, Kuroiso-shi, Tochigi-ken. 3-XI-1994. From litter under forest of *Q. mongolica grosseserrata* and *Betula ermani*. --- 2 exs. Shirataki-sawa, Hujiwara-machi, Tochigi-ken. 8-X-1995. From litter under grove of *Fagus crenata* and *Aesculus turbinata*. --- 3 exs. Kurikara Pass, Toyama-ken. 18-VI-1995. Y. HIRAUCHI. From litter under grove of *Fagus crenata*. --- 2 exs. Bijodaira, Toyama-ken. 12-VII-1998. Y. HIRAUCHI. From litter under forest of *F. crenata*. --- 1 ex. Mt. Hiei, Kyoto-fu. S. CHINONE. From litter under forest of *Cryptomeria japonica*. --- 3 exs. Matsuyama-shi, Ehime-ken. 19-X-1980. S. CHINONE. From litter under grove of *Castanopsis cuspidata* and *C. myrsinaefolia*. --- 2 exs. Kubokawa-machi, Kochi-ken. 23-X-1980. S. CHINONE. From litter under grove of *Castanopsis cuspidata* and *Cinnamomum camphora*. --- 3 exs. Tatsukushi, Tosashimizu-shi, Kochi-ken. 22-X-1980. S. CHINONE. From litter under grove of *Cinnamomum camphora*, *Machilus thunbergii* and *Castanopsis cuspidata*. --- 2 exs. Oboke, Nishiiyayama-mura, Tokushima-ken. 24-X-1980. From litter under grove of *C. japonica*. --- 1 ex. Yawatahama-shi, Ehime-ken. 22-X-1980. S. CHINONE. From litter under grove of *Cinnamomum camphora* and oak tree. --- 3 exs. Mt. Tsurumidake, Beppu-shi, Oita-ken. 29-III-1990. T. USHIRODA & H. SAKAYORI. From litter under deciduous broad-leaved forest. --- 1 ex. Usuki-shi, Oita-ken. From litter under laurel forest. The same date and collectors as the former. --- 4 exs. Kurakake, Uenohara-machi, Kokubu-shi, Kagoshima-ken. 30-III-1990. K. ISHII and H. SAKAYORI. From litter under laurel forest. --- 3 exs. The Kirishima Shrine, Kirishima-machi, Kagoshima-ken. 31-III-1990. K. ISHII & H. SAKAYORI. From litter under laurel forest (*Castanopsis acuta* etc.). --- 1 ex. Hayashida-onsen, Makizono-machi, Kagoshima-ken. 31-III-1990. K. ISHII & H. SAKAYORI. From under grove of *Abies firma* and *Pinus densiflora*. --- 1 ex. Tonan

Botanical Garden, Okinawa-ken. 5-V-1974. S. CHINONE. --- 1 ex. Sashiki-machi, Okinawa-ken. 8-V-1974. S. CHINONE.

**Measurements:** (in  $\mu\text{m}$ ,  $n=5$ ): Body length 165-185 (av. 174), width 85-98 (av. 90), L/W 1.9. Length of setae (av.): *le* 8, *c* 6, *lm* 9, *lp* 11.

**Prodorsum:** Rostrum with rounded tip, bilaterally with a pair of short tooth directing downwards, followed by about 5 or 6 teeth of diverse length; a deep and wide incision between 1st and 2nd tooth as well as 2nd and 3rd one. Rostral region generally smooth, but frontal and lateral border somewhat granulated. Posterior area in front of tectopedial fields with some tubercles or short ridges. Tectopedial field wide, oval or triangular in shape, its anterior end opened. Lamellar knob rather large, somewhat triangular. Prodorsal condyle *co.pm* large, diamond-shaped. The head of sensillus long and slender as sickle-shape, with fine cilia on outer edge.

**Notogaster:** Notogaster oval in shape, 1.1× as long as wide. Notogastral condyles *co.nm* triangular, *co.nl* keel-like, their anterior tips obtuse. Nine pairs of dorsal setae: seta *c* smooth, short, originating between *co.nm* and *co.nl*; seta *la* smooth or barbed distally; other setae feathered, except *p*<sub>1</sub> and *p*<sub>2</sub> which are short and smooth; seta *la* inserted near to *lm* and slightly ahead at the level of seta *lm*. The number of feather setae occasionally reduced up to two pairs (*h*<sub>1</sub> and *h*<sub>2</sub>). *RLN* of setae: *lm* 9, *lp* 12.

**Ventral aspect:** Epimeral cavity not developed. Setal formula of epimerata: 3-1-3-3. Five pairs of genital setae: *g*<sub>1</sub> longer than the rest. Genital plate as long as anal plate. Adanal lyrifissure *iad* located obliquely against at anal plate. Relative length of setal intervals: *ag-ag* > *ad*<sub>2</sub>-*ad*<sub>2</sub> > *ad*<sub>1</sub>-*ad*<sub>1</sub> > *ad*<sub>3</sub>-*ad*<sub>3</sub>.

**Remarks:** The new species stands near to *Suctobelbella semiplumosa* (BALOGH et MAHUNKA, 1967) comb. n. from Vietnam and *Suctobelbella pulmata* (HAMMER, 1979), comb.n. It is, however, discriminated from them by the following points, (1) five pairs of genital setae; six pairs in the latter, (2) dorsal setae *p*<sub>1</sub> and *p*<sub>2</sub> short and smooth; feathered in *S. semiplumosa*, thickened in *S. pulmata* (3) the number of rostral teeth: 5 to 7 in new species, but 2 or 3 teeth in the latter species.

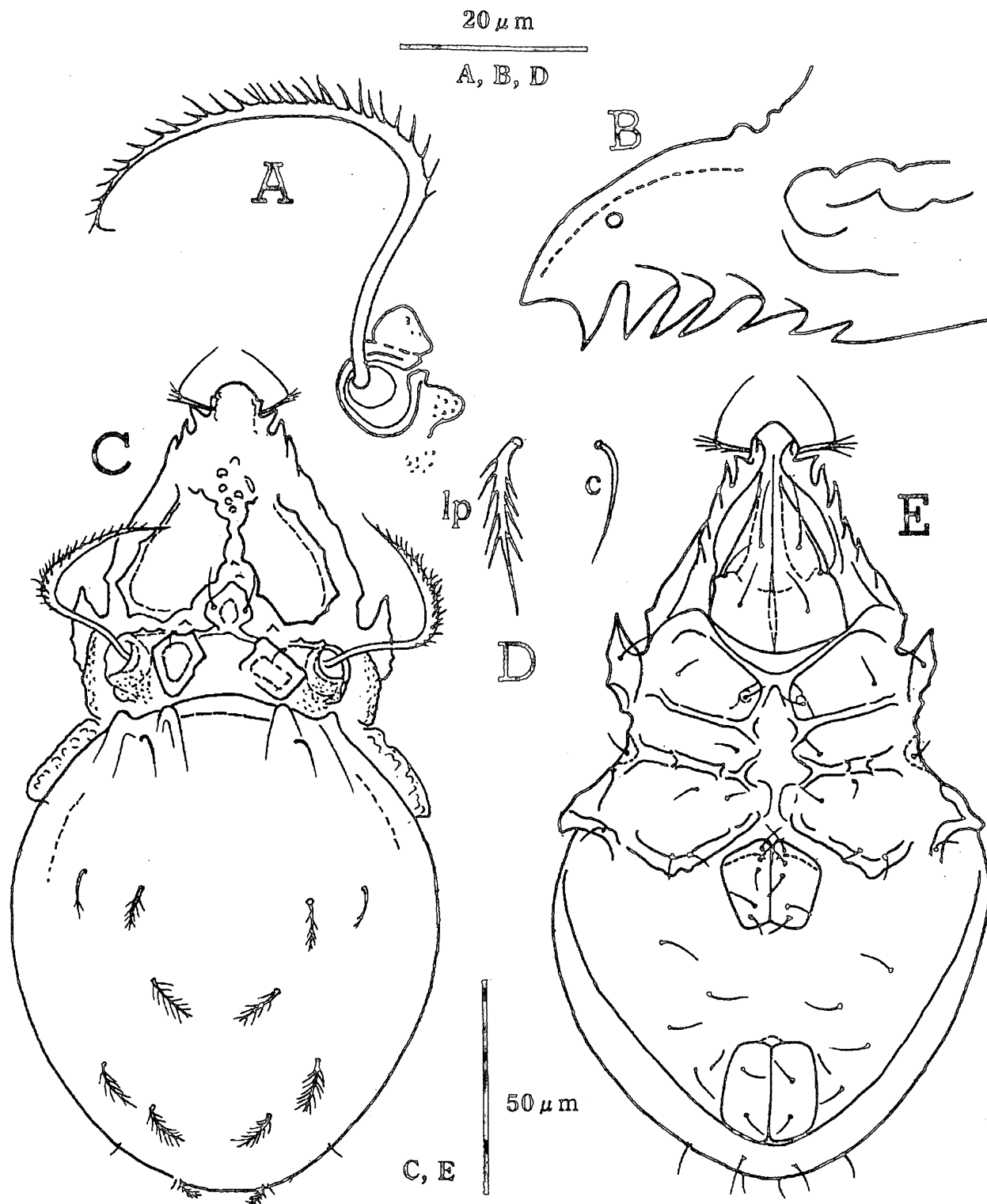


Fig.49: *Suctobelbella plumosa* sp. n. --- A: Sensillus. B: Rostrum in lateral view. C: Dorsal aspect. D: Notogastral setae. E: Ventral aspect.

*Suctobelbella ibarakiensis* sp. n.

[Hitachi-chibimadodani]

(Fig.50)

**Material examined:** Holotype (NSMT-Ac 11437); Shimasu, Ushibori-machi, Ibaraki-ken. 27-V-1979. S. CHINONE. From litter under grove of *Quercus acutissima*. --- 2 paratypes (NSMT-Ac 11438 and 11439), the same data as the holotype. --- 6 exs. From litter under grove of *Castanopsis cuspidata* and *Machilus thunbergii*, the other data same as the holotype. --- 1 ex. Narage, Ono-mura, Ibaraki-ken. 6-VIII-1979. S. CHINONE. From litter under grove of *Pinus densiflora*.

**Measurements:** (in  $\mu\text{m}$ ,  $n=5$ ): Body length 150-165 (av. 155), width 85-90 (87), L/W 1.8. Length of setae: *le* 9, *c* 35, *lm* 42, *lp* 49.

**Prodorsum:** Rostrum concave medially, bilaterally with a forked or truncated lobe. About 4 rostral teeth: 1st one thick and triangular, 2nd one acute or sometimes concave, 3rd and 4th ones acute, a deep incision between 1st and 2nd ones. Rostral region elevated rectangularly, bordered by short ridges and ornamented with granules. Tectopedial field oval in shape. Lamellar knob comparatively large, rather triangle or trapezoid in shape. Some granules found around it. The head of sensillus long, slender, sickle-shape, curved inwards, with long bristles on outer side in a row.

**Notogaster:** Notogaster oval in shape,  $1.1\times$  as long as wide. Notogastral condyles small; interval of *co.nm-co.ml* about equal to *co.nm-co.nm*. Nine pairs of dorsal setae: 6 pairs thick and very long, curved at basal portion, swollen at middle and tapering to the tip; three pairs *p*<sub>1</sub>*p*<sub>2</sub> and *p*<sub>3</sub> short. A median notogastral light spot found at the level of setae *c*. Seta *la* inserted remote from *lm* and at the level of medium position between *c* and *lm*. *RLN* of setae: *lm* 43, *lp* 50.

**Ventral aspect:** Epimeral setae rather long. Five pairs of genital setae; *g*<sub>1</sub> longer than the rest. Genital plate  $1.1\times$  as long as anal plate. Relative length of setal intervals: *ag-ag* > *ad*<sub>2</sub>-*ad*<sub>2</sub> > *ad*<sub>3</sub>-*ad*<sub>3</sub> = *ad*<sub>1</sub>-*ad*<sub>1</sub>.

**Remarks:** The new species is discriminated from other congeneric species by the following points; (1) notogastral setae thick and very long, swollen at middle, tapering to the tip, (2) head of sensillus long, slender, sickle-shape, with long bristles on outer edge, (3) the shape of rostral area: rostrum concave medially, rostral region elevated rectangularly.

*Suctobelbella frondosa* AOKI et FUKUYAMA, 1976

[Konoha-madodani]

(Fig.51)

*Suctobelbella frondosa* AOKI et FUKUYAMA, 1976, p.209, figs. 1-6.

New localities from Japan: 1 ex. The Shirakami Mountainous District, Akita-ken. 27-VIII-1994. Collected by members of Ibaraki Soil Animal Association. From litter under forest of *Fagus crenata* and *Pterocarya rhonifolia*. --- 4 exs. Mt. Hanakame, Daigo-machi, Ibaraki-ken. 15-V-1994. S. CHINONE. From litter under forest of *Abies firma*, *Fagus crenata*, *Quercus serrata* and a maple tree. --- 2 exs. The Matsuyama Castle, Matsuyama-shi, Ehime-ken. 19-X-1980. S. CHINONE. From litter under grove of *Castanopsis cuspidata* and oak tree. -- 1 ex. Kubokawa-cho, Kochi-ken. 23-X-1980. S. CHINONE. From litter under grove of *Castanopsis cuspidata*, *C. acuta* and *Cinnamomum camphora*. --- 1 ex. Makizono-cho, Kagoshima-ken. K. ISHII & H. SAKAYORI. 31-VIII-1990. From litter under grove of *Abies firma*, *Pinus densiflora* and laurel forest.

**Diagnosis:** Nine pairs of leaf-shaped notogastral setae with serrate margin. The shape of 4 lateral teeth on each side of rostrum. The strongly developed chitinous ring behind the anterior margin of notogaster. Notogastral condyles well developed: *co.nm* reaching posteriorly the level of insertion for setae *ti*. Five pairs of genital setae. Setae *ad*<sub>1</sub> inserted at the level of setae *an*<sub>1</sub>.

Body length ( $n=6$ , from specimens of new locality): 167-185 (av.172), width: 90-97 (av.94).

**Distribution:** Japan.

*Suctobelbella hastata* PANKOW, 1986

[Yarige-chibimadodani]

(Fig.52)

*Suctobelbella hastata* PANKOW, 1986, p. 1273-1274, Figs.1-2.

**Material examined:** 5 exs.; Kodaka, Aso-machi, Ibaraki-ken. 6-VII-1979. S. CHINONE. From litter under grove of *Pinus densiflora* and *Castanopsis cuspidata*. --- 3 exs.: Shimasu, Ushibori-machi, Ibaraki-ken. 27-V-1979. S. CHINONE. From litter under grove of *Quercus acutissima*. --- 1 ex.: the Kashima Shrine, Ibaraki-ken. 19-VIII-1981. S. CHINONE. From litter under forest of *Abies firma* and *Cryptomeria japonica*. --- 4 exs.: Narage, Ono-mura,

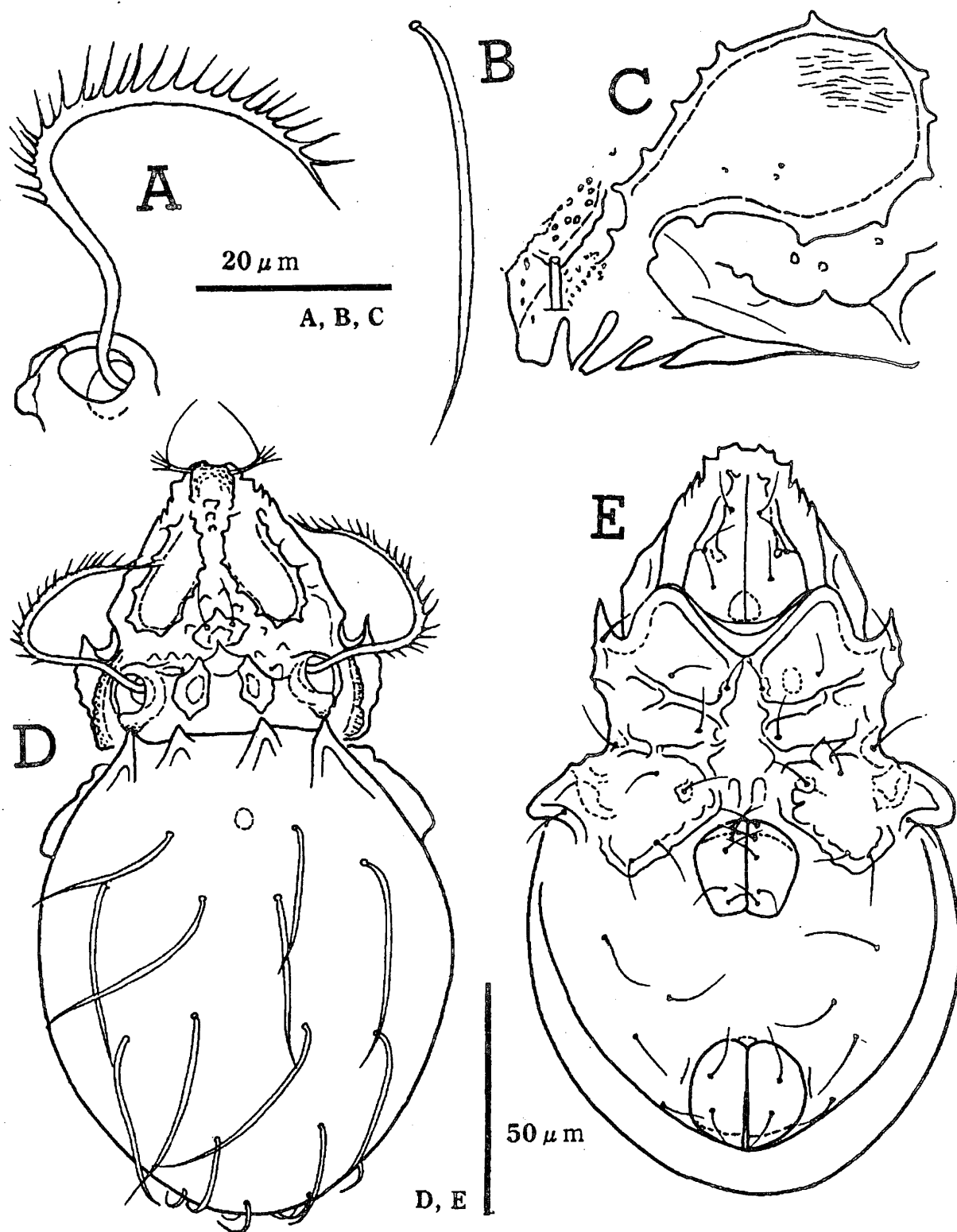


Fig.50: *Suctobelbella ibarakiensis* sp. n.--- A: Sensillus. B: Notogastral seta. C: Prodorsum in lateral view. D: Dorsal aspect. E: Ventral aspect.



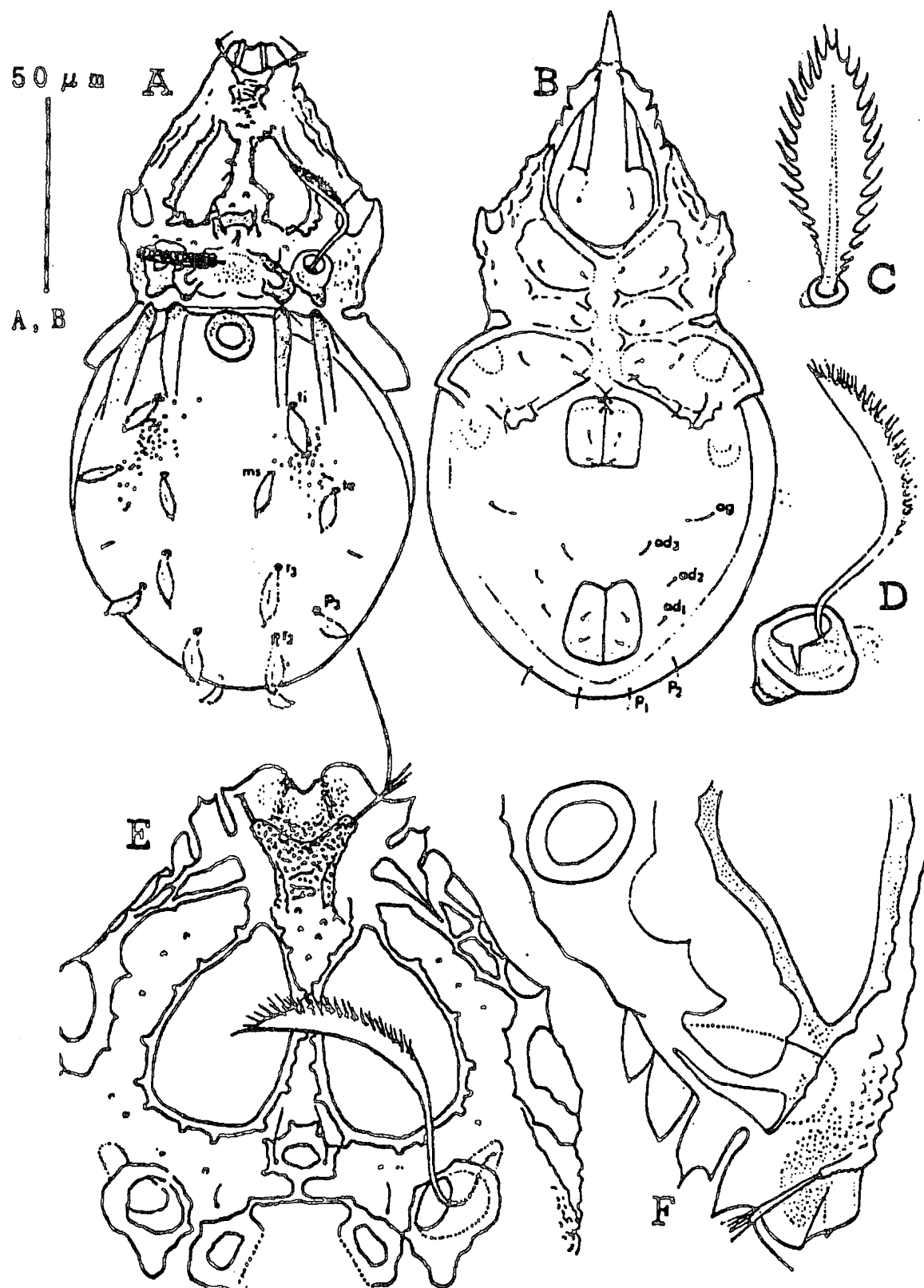


Fig.51: *Suctobelbella frondosa* AOKI et FUKUYAMA, 1976....A: Dorsal side, B: Ventral side, C: Notogastral seta, D: Sensillus and bothridium, E: Prodorsum, F: Lateral view of rostral region. (after AOKI et FUKUYAMA, 1976)

Ibaraki-ken. 6-VII-1979. S. CHINONE. From litter under grove of *Pinus densiflora*. --- 2 exs.: Mt. Nishikanasa, Kanasago-machi, Ibaraki-ken. 24-VIII-1984. S. CHINONE. From litter under grove of *Castanopsis cuspidata* and *C. myrsinaefolia*. --- 4 exs.: Mt. Kaba, Ibaraki-ken. 27-VI-1986. S. CHINONE. From litter under grove of *Quercus acutissima* and *Q. serrata*. --- 3 exs.: Mt. Hanakame, Daigo-machi, Ibaraki-ken. 15-V-1994. H. SAKAYORI. From litter under forest of *Abies firma*, *Fagus crenata*. --- 4 exs.: Masaki, Taro-cho, Iwate-ken. 8-VIII-1973. From litter under grove of *Pinus densiflora*. --- 7 exs.: Mt. Kiyosumi, Chiba-ken. 18-XII-1983. S. CHINONE. From litter under forest of *Abies firma*. --- 1 ex.: Yoriimamezawa, Nasu-machi, Tochigi-ken. 16-X-1994. From litter under grove of *Castanea crenata* and *Quercus serrata*. --- 1 ex.: the Iono-onsen Shrine, Nasu-machi, Tochigi-ken. 16-X-1994. From litter under grove of *Castanopsis myrsinaefolia* and *Zelkova serrata*. --- 1 ex.: Toyohara, Nasu-machi, Tochigi-ken. 16-X-1994. From litter under grove of *Quercus serrata*, *Castanea crenata* and *Pinus densiflora*. --- 1 ex.: Yukanabe, Himi-shi, Toyama-ken. 2-V-1998. Y. HIRAUCHI. From litter under grove of *Abies firma*. --- 1 ex.: Tuwano-mach, Shimane-ken. 28-III-1972. S. CHINONE. From litter under dead trees. --- 1 ex.: Mt. Daisen, Tottori-ken. 25-III-1972. S. CHINONE. From moss. --- 1 ex.: Kubokawa-machi, Kochi-ken. 23-X-1980. S. CHINONE. From litter under grove of *Castanopsis cuspidata*. --- 1 ex.: Oboke, Nishiiyayama-mura, Tokushima-ken. 24-X-1980. S. CHINONE. From litter under grove of *Cryptomeria japonica*. --- 2 exs.: The Matsuyama Castle, Matsuyama-shi, Ehime-ken. 19-X-1980. S. CHINONE. From litter under grove of *Castanopsis cuspidata* and oak tree. --- 1 ex.: Enada, Usuki-shi, Oita-ken. 29-III-1990. T. USHIRODA and H. SAKAYORI. From litter under laurel forest. --- 2 exs.: Kurakake, Uenohara, Kokubu-shi, Kagoshima-ken. K. ISHII and H. SAKAYORI. From litter under laurel forest. --- 2 exs.: the Hayashida Onsen, Makizono-machi, Kagoshima-ken. 31-III-1990. K. ISHII & H. SAKAYORI. From litter under laurel forest.

**Measurements:** (in  $\mu\text{m}$ ,  $n=8$ ): Body length 150-170 (av. 159), width 86-95 (av. 91), L/W 1.7. Length of setae:

*le* 7, *c* 17, *lm* 17, *lp* 19.

**Prodorsum:** Rostral tip looked projecting in dorsal view but concave widely by observation of crushed specimens. Rostral lobe wide and roundish, followed by about 3 teeth: 1st one thick and triangular; 2nd one acute, a deep incision between 1st and 2nd ones; 3rd one short. Rostral region elevated, with vertical short ridges on both sides and granulated densely. Tectopedial field narrow. The area between tectopedial fields and posterior surface of prodorsum with some tubercles. Lamellar knob large, pentagonal in shape. Sensillus long slender sickle-shape; distal half of the stalk and the swollen head with rather long bristles on its outer edge somewhat in a row.

**Notogaster:** Notogaster oval in shape,  $1.1\times$  as long as wide. Notogastral condyles developed, *co.nm* triangular, *co.nl* thick keel-like, extending backwards beyond the insertion of setae *c*. An oval median spot found at a level of posterior end of keel of *co.nm*. Nine pairs of dorsal setae: the setae thick and lanceolate at distal half, except *p*<sub>1</sub> and *p*<sub>2</sub> which are fine setiform. Seta *h*<sub>1</sub> sometimes smooth. *RLN* of setae: *lm* 17, *lp* 19.

**Ventral aspect:** Epimeral cavity not developed. Setal formula of epimerata: 3-1-3-3. Five pairs of genital setae. Genital plate about as long as anal plate. Relative length of setal intervals:  $ag-ag > ad_2-ad_2 > ad_3-ad_3 = ad_1-ad_1$ .

**Remarks:** The Japanese specimens well accord with the description of *Suctobelbella hastata* PANKOW, 1986 from the Kuril Islands, but differ from it by the following points, (1) the shape of sensillus: distal half of the stalk and the head with rather long bristles on a row, while at the kurilian specimens only the head with fine bristles, (2) dorsal seta *h*<sub>1</sub> sometime setiform, while lanceolate at the kurilian specimens. This species stands nearer to *Suctobelbella claviseta* (HAMMER, 1961) including its subspecies *S. claviseta nipponica* FUJIKAWA, 1986, but is distinguished from the latter two species by the shape and number of dorsal setae: *S. hastata* has 9 smooth lanceolate setae; *S. claviseta* has 9 spear-shaped setae with short bristles; *S. claviseta nipponica* has only 8 lanceolate, barbed setae.

**Distribution:** the Kuril Islands and Japan.

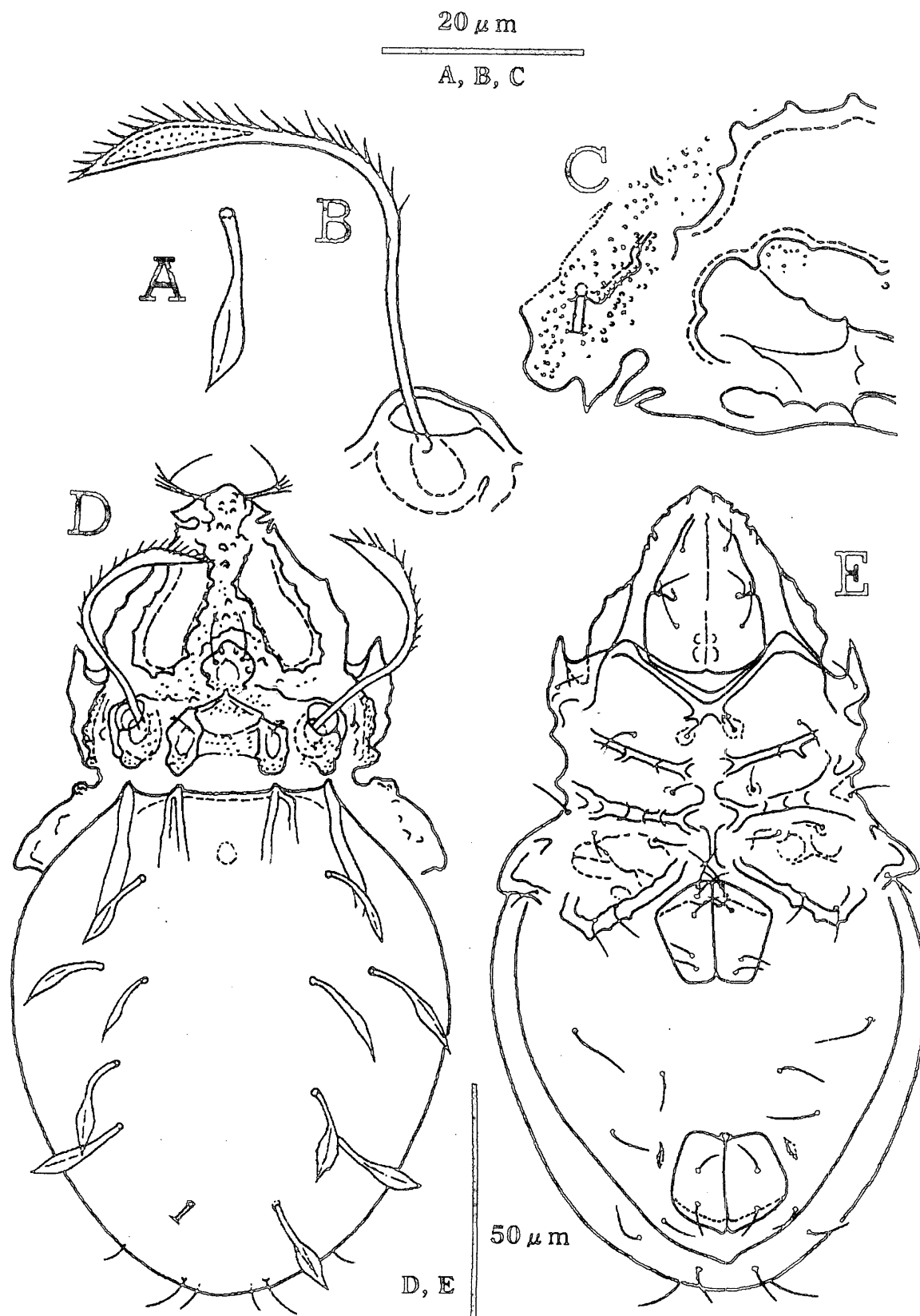


Fig.52: *Suctobelbella hastata* PANKOW, 1986.---A: Notogastral seta. B: Sensillus. C: Prodorsum in lateral view. D: Dorsal aspect. E: Ventral aspect.

***Suctobelbella claviseta nipponica* FUJIKAWA, 1986**

[Yamato-madodani]

(Fig.53)

*Suctobelbella claviseta nipponica* FUJIKAWA, 1986, p.32, fig. 4.

**Diagnosis:** Eight pairs of notogastral setae; six pairs of them lanceolate and barbed. Rostrum concave with 4 rostral teeth on each side. Sensillus long and barbed unilaterally with slightly expanded head terminating in a fine tip. Two pairs of notogastral condyles connected by a chitinous bridge: inner ones shorter than outer ones. Five pairs of genital setae. Body length :175 $\mu$ m,width: 91 $\mu$ m.

**Distribution:** Japan.

***Suctobelbella pumila* sp. n.**

[Yamato-chibimadodani]

(Fig.54)

**Material examined:** Holotype (NSMT-Ac 11440); Mt. Fuji, Shizuoka-ken. 20-IX-1975. S. CHINONE. From litter under grove of *Abies mariesii*. --- 1 paratype (NSMT-Ac 11441): Tomikawa, Monbetsu-machi, Hokkaido. 28-VII-1983. S. CHINONE. From litter under grove of *Quercus mongolica grosseserrata*. --- 1 paratype (NSMT-Ac 11442): Mt. Hanakame, Daigo-machi, Ibaraki-ken. 23-VIII-1984. From litter under forest of *Fagus crenata* and *Abies firma*. --- 1 ex. Tamada, Asahi-mura, Ibaraki-ken. 9-V-1979. S. CHINONE. From litter under grove of *Pinus thunbergii*.--- 1 ex. Kuroiso-shi, Tochigi-ken. 4-XI-1994. From litter *Abies mariesii* and *Tsuga diversifolia*.--- 7 exs. Mt. Kengamine, Yaita-shi, Tochigi-ken. 4-XI-1994. From litter under forest of *Picea bicolor*. --- 1 ex. Okukinu-rindo, Kuriyama-mura, Tochigi-ken. 9-IX-1995. From litter under grove of *Tsuga diversifolia*. --- 1 ex. Minakata, Kurobane-machi, Tochigi-ken. 15-X-1994. From litter under grove of *Quercus mongolica grosseserrata* and *Fagus crenata*.

**Measurements:** (in  $\mu$ m, n=5): Body length 160-172 (av.167), width 86-100 (av. 93), L/W 1.8. Length of setae: *le* 7, *c* 17, *lm* 19, *lp* 21.

**Prodorsum:** Rostral apex slightly convex medially, bilaterally with a wide lobe, followed by about 3 teeth; 1st one thick triangular, 2nd and 3rd ones thin, touching each other, a deep incision between 1st and 2nd ones. Rostral region with irregular vertical ridges on both sides and granulated slightly. Tectopedial field narrow with anteriorly opened margin. Some tubercles found between

tectopedial fields. Lamellar knob with truncate or concave anterior corner. Sensillus slender sickle-shape or crescent-shape; its head and distal part of stalk with about 15 fine rather long bristles on outer edge.

**Notogaster:** Notogaster oval in shape, 1.1 $\times$  as long as wide. Notogastral condyles *co.nm* triangular; *co.nl* keel-like, longer than *co.nm*. Nine pairs of dorsal setae; the setae medium-sized, thick and gently curved except *p*<sub>1</sub> and *p*<sub>2</sub> which are short. A median oval spot vague, sometimes disappearing, situated at a level slightly posterior to *c*. Lyrifissure *im* found at a level anterior to *lp* and situated obliquely. *RLN* of setae: *lm* 19, *lp* 21.

**Ventral aspect:** Setal formula of epimerata: 3-1-3-3. Five pairs of genital setae, Genital plate about as long as anal plate. Seta *ag* longer than seta *ad*<sub>3</sub>. Relative length of setal intervals: *ag-ag*>*ad*<sub>2</sub>-*ad*<sub>2</sub>>*ad*<sub>3</sub>-*ad*<sub>3</sub>.

**Remarks:** The new species is closely related to *Suctobelbella arcana* MORITZ, 1970, but differs from the latter in the following points: (1) the shape of sensillus : distal part of the stalk and the head with about 15 fine long bristles, while in the *S. arcana* only the head with many fine bristles, (2) size of the body; the new species is much smaller than the latter.

***Suctobelbella verrucosa* sp. n.**

[Ibo-chibimadodani]

(Fig.55)

**Material examined:** Holotype (NSMT-Ac 11443); Mt. Hanakame, Daigo-machi, Ibaraki-ken. 15-V-1994. S. CHINONE. From litter under forest of *Abies firma*, *Fagus crenata* and *Quercus serrata*. --- 4 paratypes (NSMT-Ac 11444 to 11447), the same data as the holotype.

**Measurements:** (in  $\mu$ m, n=5): Body length 160-180 (av. 170), width 90-95 (av. 93), L/W 1.8. Length of setae (av.): *le* 9, *c* 4, *lm* 4, *lp* 4.

**Prodorsum:** Rostral apex slightly concave, bilaterally with a truncate lobe each, followed by 3 or 4 teeth: 1st and 2nd ones robust, 3rd and 4th ones thin, 1 incision between 1st and 2nd ones widely. Seta *ro* with a knee-bent. Rostral region granulated, followed posteriorly by some tubercles and divided by vertical ridges on both sides. Tectopedial field oval in shape, well defined, inner half-surface granulated densely. Lamellar knob rather pentagonal. Setae *le* about 1.5 $\times$  as long as their mutual distance. Sensillar head semilunar, long and slender with cilia on outer edge. Densely granulation found on surface

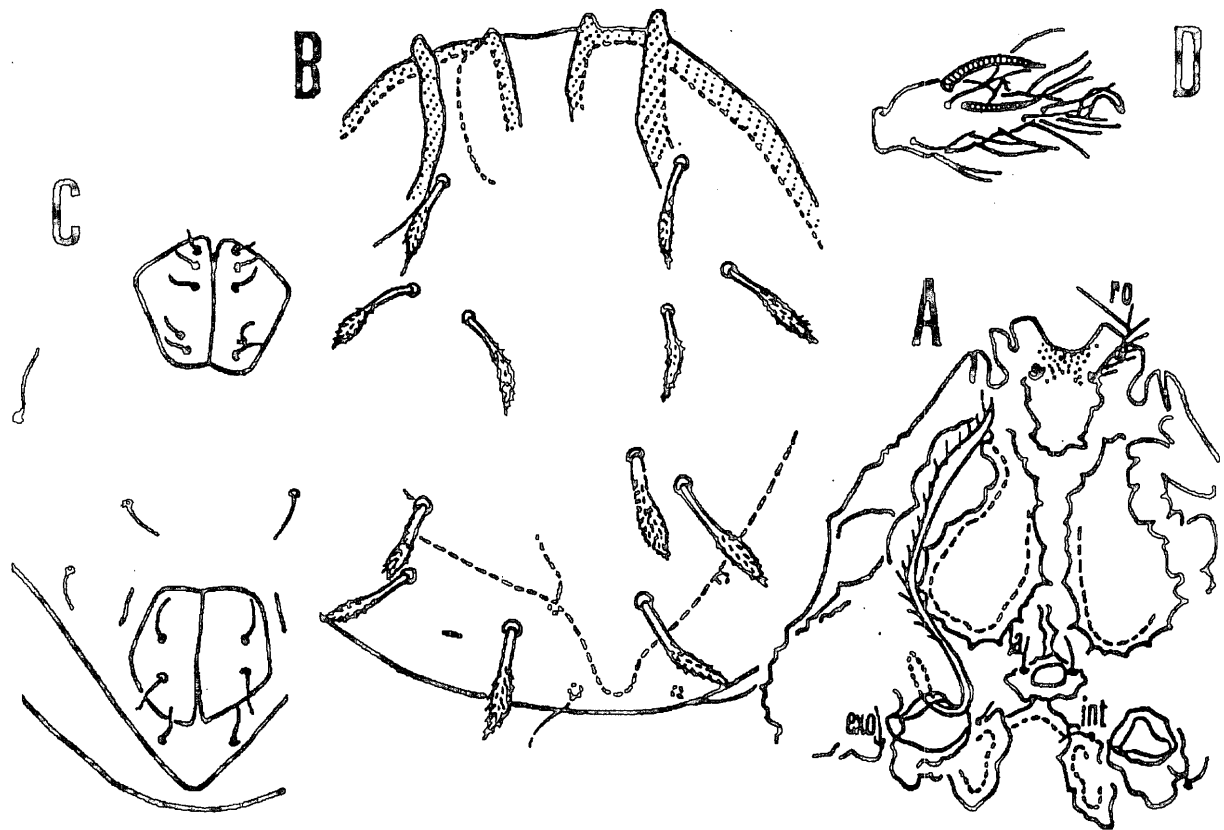


Fig.53: *Suctobelbella claviseta nipponica* FUJIKAWA, 1986....A: Prodorsum, B: Notogaster, C: Anogenital region, D: Tarsus I. (after FUJIKAWA, 1986)

around lamellar knob and between *co.pm*.

**Notogaster:** Notogastral condyles keel-like: *co.nl* long, about 2× as long as *co.nm*. A median oval spot well developed, projecting like a roundish tubercle at a level posterior to end of *co.nm*. Notogastral surface with about 5 pairs of roundish excrescences. Nine pairs of notogastral setae: all setae short and rather thick; setae *lm*, *la*, *lp*, *h*<sub>1</sub> and *h*<sub>2</sub> inserted on excrescences; seta *c* at a level posterior to *co.nl*, seta *la* at a level of *lm*. Lyrifissure *im* situated transversely at a level of seta *lp*. Posterior margin of notogaster uneven slightly.

*RLN* of setae: *lm* 4, *lp* 4.

**Ventral aspect:** Five pairs of genital setae: *g*<sub>1</sub> longer than the rest; *g*<sub>1</sub>, *g*<sub>2</sub> and *g*<sub>3</sub> near to anterior margin, whereas *g*<sub>4</sub> and *g*<sub>5</sub> near to posterior margin. Anal plate 1.1× as long as genital plate. Seta *an*<sub>2</sub> inserted close to lateral margin of anal plate. Relative length of setal

intervals:  $ag-ag > ad_2-ad_2 \geq ad_1-ad_1 > ad_3-ad_3$ . Setal formula of epimerata: 3-1-3-3.

**Remarks:** The new species is closely related to *Suctobelbella ornata* (BALOGH et MAHUNKA, 1969), comb. n., but discriminated from the latter by the following points: (1) the head of sensillus long, slender and semilunar, while fusiform in the latter, (2) the position of median roundish tubercle posterior to anterior margin of notogaster, but just on the anterior margin in the latter species, (3) five pairs of genital setae, while 6 pairs in the latter. *S. ornata* treated as the species of the genus *Suctobelbilla* by BALOGH & MAHUNKA (1969). The author, however, changed the genus to *Suctobelbella* by having two pairs of notogastral condyles and the shape of prodorsum.

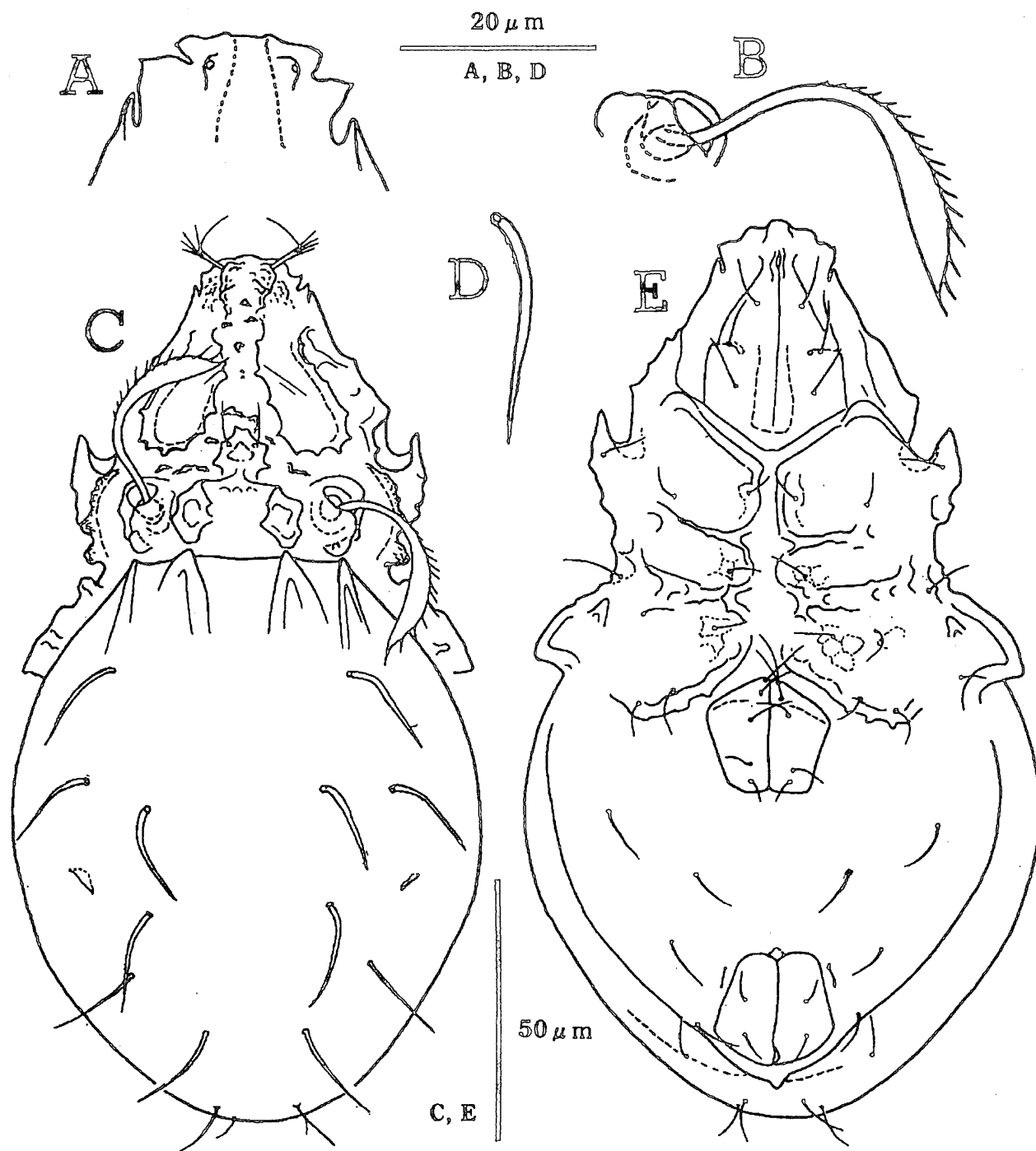


Fig.54: *Suctobelbella pumila* sp. n. ---A: Rostral teeth. B: Sensillus. C: Dorsal aspect. D: Notogastral seta. E: Ventral aspect.

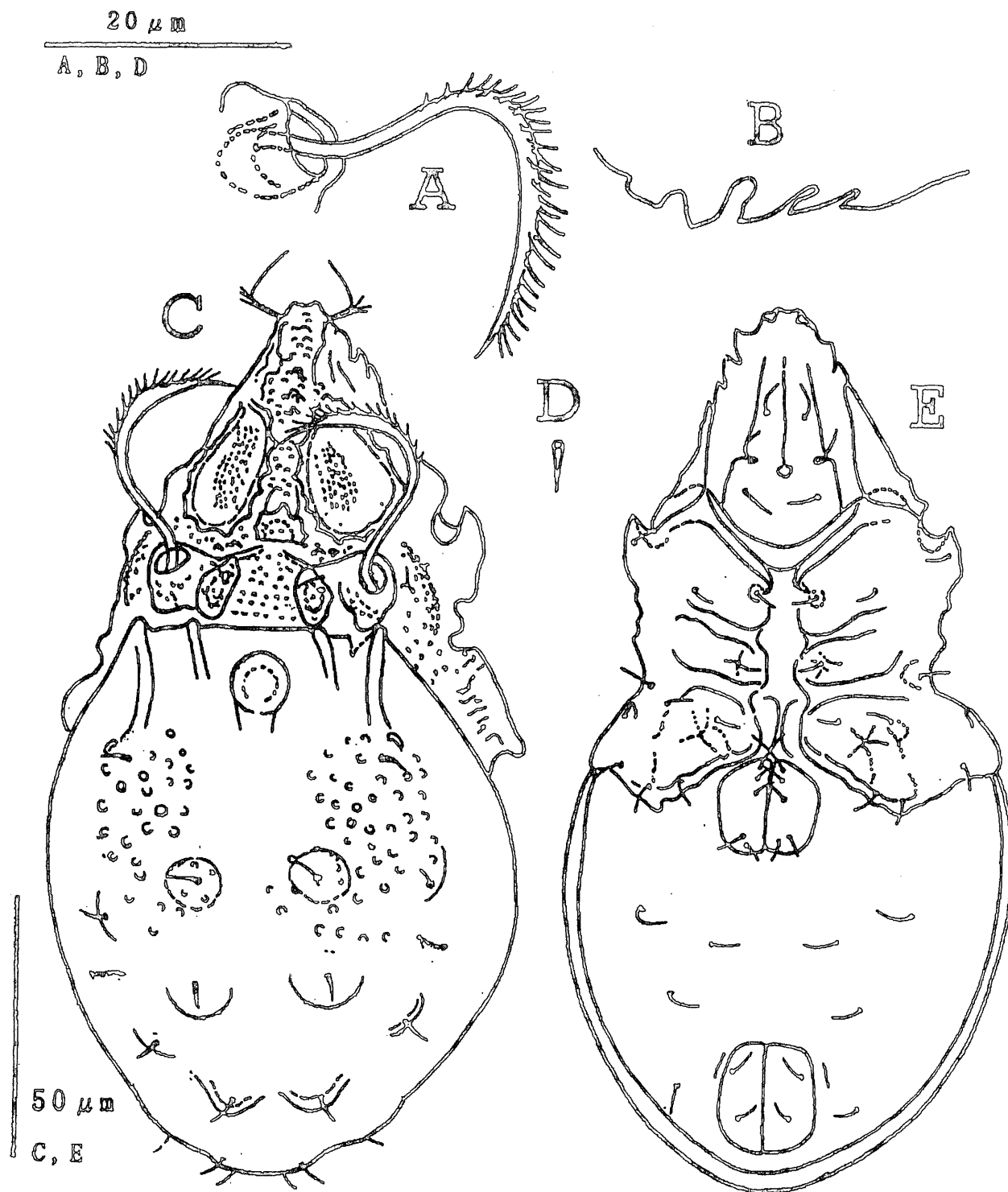


Fig.55: *Suctobelbella verrucosa* sp. n.--- A: Sensillus. B: Rostral teeth. C: Dorsal aspect. D: Notogastral seta. E: Ventral aspect.

***Suctobelbella reticulatoides* sp. n.**

[Niseamime-madodani]

(Fig.56)

**Material examined:** Holotype (NSMT-Ac 11448); Mt. Yamizo, Ibaraki-ken. 28-IX-1981. S. CHINONE. From litter under forest of *Quercus mongolica grosseserrata* and *Fagus crenata*. --- 4 paratypes (NSMT-Ac 11449 to 11452); Mt. Yamizo. 24-VII-1984. From litter under forest of *Fagus crenata*. The other data are the same as the holotype. --- 1 ex. Mt. Tatsuware, Ibaraki-ken. 13-XI-1982. S. CHINONE. From litter under grove of *Fagus crenata*. ---1 ex. Mt. Hanakame, Ibaraki-ken. 23-VIII-1984. S. CHINONE. Under forest of *Fagus crenata* and *Abies firma*. --- 1 ex. Mt. Kaba, Ibaraki-ken. 27-VI-1986. S. CHINONE. From litter under grove of *Quercus serrata*. --- 1 ex. The Kashima Shrine, Ibaraki-ken. 28-XI-1982. S. CHINONE. From litter under forest of *Abies firma* and *Cryptomeria japonica*.--- 3 exs. Mt. Kiyosumi, Chiba-ken. 18-XII-1983. S. CHINONE. From litter under forest of *Abies firma* and *Cyclobalanopsis glauca*. --- 1 ex. The Shibetsu Pass, Shibetsu-shi, Hokkaido. 31-VII-1983. S. CHINONE. From litter under grove of *Picea jezoensis*, *Quercus mongolica grosseserrata* and *Betula ermani*. --- 2 exs. Masaki, Taro-cho, Iwate-ken. 8-VIII-1973. S. CHINONE. From litter under grove of *Pinus densiflora*. --- 1 ex. Near the Yozasagawa Bridge, Nasu-machi, Tochigi-ken. 3-XI-1994. From litter under grove of *Quercus mongolica grosseserrata*. --- 1 ex. The Iono-onsen Shrine, Nasu-machi, Tochigi-ken. 16-X-1994. From litter under grove of *Zelkova serrata* and *Castanopsis* sp. --- 1 ex. Sonobe-machi, Kyoto-fu. 24-III-1972. S. CHINONE. From litter under grove of *Pinus densiflora*. --- 3 exs. Tsuwano-machi, Shimane-ken. 28-III-1972. S. CHINONE. From litter under grove of *Pinus densiflora*.--- 5 exs. Kubokawa-machi, Kochi-ken.--- 2 exs. Mt. Setokura, Toyama-ken. 10-V-1998. --- 1 ex. Ogura, Beppu-shi, Oita-ken. 29-III-1990. T. USHIRODA & H. SAKAYORI. From litter under laurel forest. --- 2 exs. Kurakake, Uenohara, Kokubu-shi, Oita-ken. 30-III-1990. K. ISHII & H. SAKAYORI. From litter under laurel forest.

**Measurements:** (in  $\mu\text{m}$ ,  $n=6$ ): Body length 198-220 (av. 205), width 116-130 (av. 123). Length of setae: *le* 10, *c* 24, *lm* 14, *lp* 15.

**Prodorsum:** Rostral tip rounded in dorsal view but straight by crushed specimens, bilaterally with a vertical

ridge and a triangular lobe, followed by 3 teeth; 1st one thick, 2nd and 3rd ones thin, touching each other. Rostral area and the surface between tectopedial fields showing complicated network patterns. Tectopedial field rather small and narrow. Lamellar knob irregular in shape. Sensillus long sickle-shaped; distal part of peduncle and knife-shaped head with many bristles on outer edge in some rows.

**Notogaster:** Notogaster roundish, about as long as wide. Notogastral condyles well developed; *co.nl* and *co.nm* slender triangular, extending backwards at a level to setae *c*. Nine pairs of dorsal setae slender; seta *c* longest, just reaching the insertion of seta *lm*; seta *lm* not reaching seta *lp*; postero-marginal setae *p*<sub>1</sub> and *p*<sub>2</sub> short. *RLN* of setae: *lm* 11, *lp* 12.

**Ventral aspect:** Epimeral cavity not developed. Setal formula of epimerata: 3-1-3-3. Epimeral setae rather long, about as long as genital setae and the other ventral setae. Posterior epimeral regions showing some complicated patterns. Genital plate smaller than the anal plate. Five pairs of genital setae: *g*<sub>1</sub> about as long as the rest of genital setae. Relative length of seal intervals:  $ag-ag > ad_2-ad_2 > ad_1-ad_1 \geq ad_3-ad_3$ .

**Remarks:** The new species is discriminated from its congeners by the following points: (1) median surface of prodorsum with complicated network patterns, (2) the long sickle-shaped head of sensillus, (3) the shape of well developed notogastral condyles, (4) five pairs of genital setae.

***Suctobelbella tamurai* sp. n.**

[Tamura-madodani]

(Fig.57)

**Material examined:** Holotype (NSMT-Ac 11453); Mt. Yamizo, Ibaraki-ken. 28-IX-1981. S. CHINONE. From litter under forest of *Fagus crenata* and *Quercus mongolica grosseserrata* and *Acer rufinerve*. --- 5 paratypes (NSMT-Ac 11454-11458): the same data as the holotype.---2 exs. Mt. Tatsuware, Takahagi-shi, Ibaraki-ken. 19-VIII-1982. S. CHINONE. From litter under grove of *Fagus crenata* and *Cryptomeria japonica*. --- 3 exs. Mt. Kaba, Ibaraki-ken. 27-VI-1986. S. CHINONE. From litter under grove of *Quercus acutissima* and *Q. serrata*. --- 5 exs. Mt. Hanakame, Ibaraki-ken. 23, 24-VIII-1984. S. CHINONE. From litter under forest of *Fagus crenata* and *Abies firma*. --- 1 ex. The Shirakami



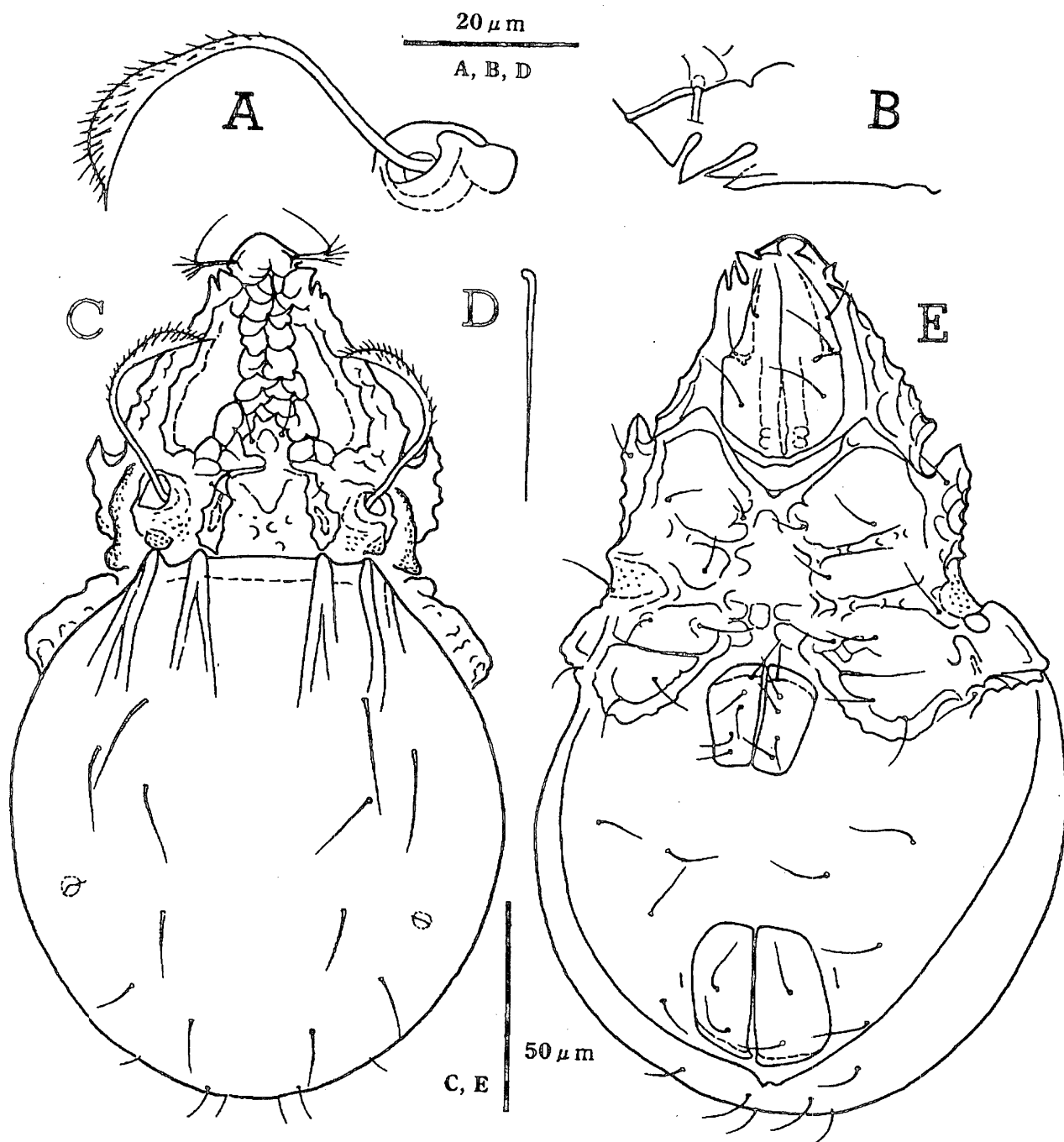


Fig.56: *Suctobelbella reticulatoides* sp. n. --- A: Sensillus. B: Rostral teeth. C: Dorsal aspect. D: Notogastral seta. E: Ventral aspect.

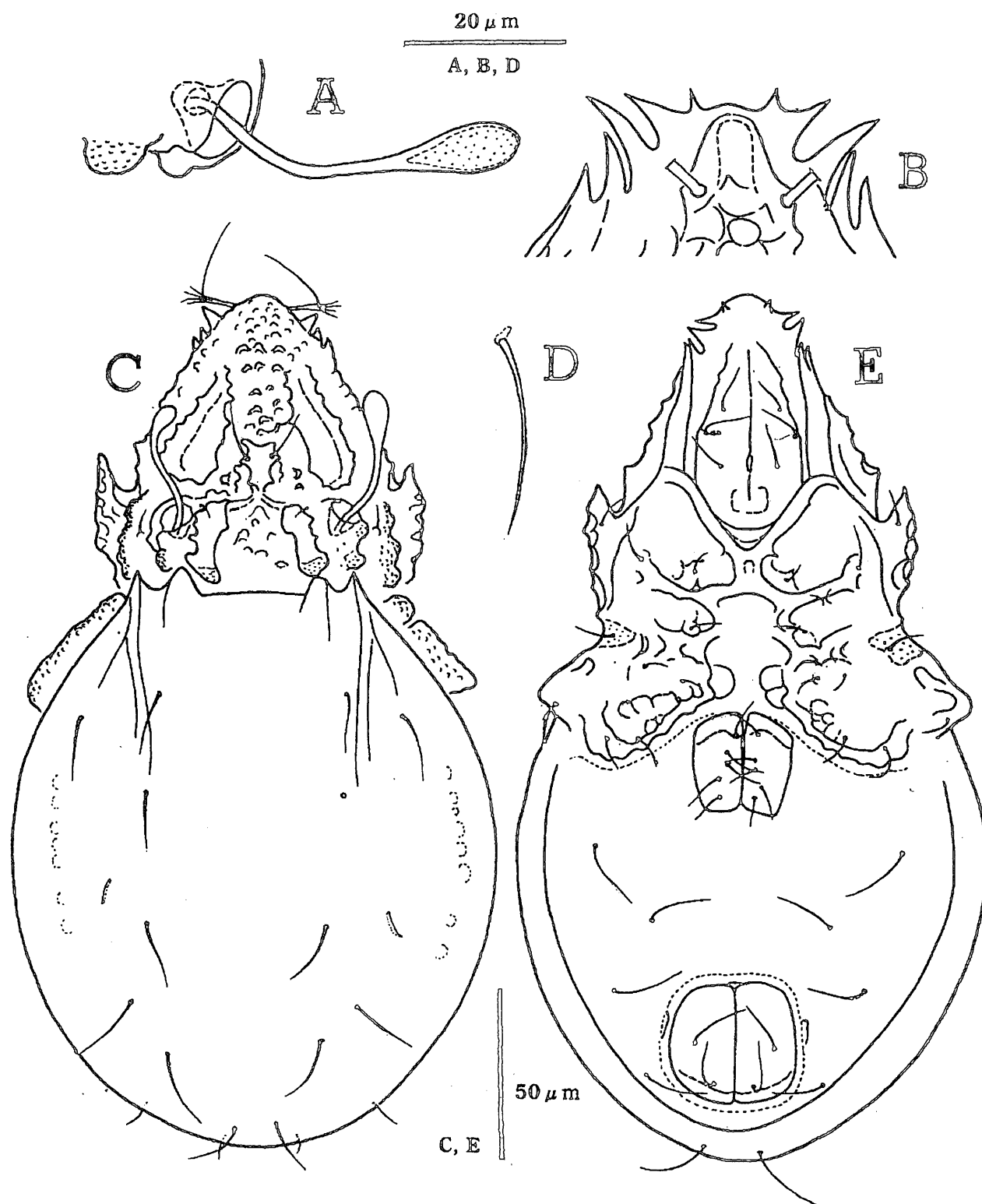


Fig.57: *Suctobelbella tamurai* sp. n. --- A: Sensillus. B: Rostral teeth. C: Dorsal aspect. D: Notogastral seta. E: Ventral aspect.

Mountainous District, Akita-ken. 27-VIII-1994. Collected by members of Ibaraki Soil Animal Association. From litter under forest of *Fagus crenata* and *Pterocarya rhonifolia*. --- 2 exs. Mt. Adatara, Fukushima-ken. 30-VII-1985. S. CHINONE. From litter under grove of *Pinus pumila*. --- 5 exs. Mt. Kiyosumi, Chiba-ken. 18-XII-1983. S. CHINONE. From litter under forest of *Abies firma*. --- 1 ex. the Kuzura Shrine, Izu Pen., Shizuoka-ken. 18-VIII-1975. S. CHINONE. From litter under grove of *Castanopsis cuspidata*. --- 1 ex. Tatsukushi, Tosashimizu-shi, Kochi-ken. 22-X-1980. S. CHINONE. From litter under grove of *Cinnamomum camphora*, *Machilus thunbergii* and *Castanopsis cuspidata*. --- 1 ex. Kubokawa-machi, Kochi-ken. 23-X-1980. S. CHINONE. From litter under grove of *C. cuspidata* and *Cinnamomum camphora*. --- 3 exs. Yashima, Takamatsu-shi, Kagawa-ken. 24-X-1980. S. CHINONE. From litter under grove of *Pinus densiflora*. --- 6 exs. Mt. Chaus, Yatsugatake, Nagano-ken. 9-VIII-1977. S. CHINONE. From litter under forest of *Abies firma*. --- 3 exs. The foot of Mt. Hodaka, Nagano-ken. 31-I-1971. S. CHINONE. From litter under grove of *Quercus serrata* and *Cryptomeria japonica*. --- 1 ex. The Kurikara Toge, Otabe-shi, Toyama-ken. 18-VI-1995. Y. HIRAUCHI. From litter under forest of *Fagus crenata*. --- 1 ex. The Bunao Pass, Kamitaira-mura, Toyama-ken. 6-X-1996. Y. HIRAUCHI. From litter under grove of *Fagus crenata*. --- 1 ex. Horasugi, Uotsu-shi, Toyama-ken. 25-X-1997. Y. HIRAUCHI. From litter under forest of *Cryptomeria japonica*. --- 1 ex. Higashimatadani, Uotsu-shi, Toyama-ken. 12-IV-1998. Y. HIRAUCHI. From litter under forest of *C. japonica*. --- 2 exs. Hirasawa, Uotsu-shi, Toyama-ken. 12-IV-1998. Y. HIRAUCHI. From litter under grove of *Aesculus turbinata*. --- 1 ex. Mt. Sanbe, Shimane-ken. 26-III-1972. S. CHINONE. From litter under grove of *Larix leptolepis*. --- 1 ex. Hamada-shi, Shimane-ken. 27-III-1972. S. CHINONE. From litter under grove of *Pinus densiflora*. --- 6 exs. Tsurumi, Beppu-shi, Oita-ken. From litter under grove of deciduous broad-leaved forest. 29-III-1990. T. USHIRODA & H. SAKAYORI.

**Measurements:** (in  $\mu\text{m}$ ,  $n=5$ ): Body length 260-283 (av.272), width 150-155 (av.152), L/W 1.8. Length of setae (av.): *le* 16, *c* 22, *lm* 23, *lp* 23.

**Prodorsum:** Rostral tip rounded, bilaterally with a very short tooth, followed by 4 other teeth of diverse length; 1st one sharp and triangular, 2nd one sharp, thick and longest, 3rd and 4th ones short and triangular; a deep and wide incision between 1st and 2nd ones. Rostral and median vertical surface of prodorsum sculptured with many irregular tubercles or short ridges. Tectopedial fields small, elongate in shape, separated widely from each other. Lamellar knob irregular in shape. Sensillus with a long peduncle and clavate head.

**Notogaster:** Notogaster oval in shape,  $1.1\times$  as long as wide. Notogastral condyles much developed: *co.nm* conical and thick, not so extending backwards; *co.nl* sharp at tip, keel-like, forked into 2 parts; inner one long and thick, reaching the level of setae *lm*, outer one thin and short. Nine pairs of dorsal setae: the setae slender, sometimes *lm* and *lp* rather thick and barbed. *RLN* of setae: *lm* 14, *lp* 14.

**Ventral aspect:** Epimeral cavity not developed. Setal formula of epimerata: 3-1-3-3. Posterior epimeral region showing some complex patterns. Anal plate about  $1.3\times$  as long as genital plate. Five pairs of genital setae:  $g_1$  not so longer than the rest. Setae *ag*, *ad*<sub>2</sub> and *ad*<sub>3</sub> long. Relative length of setal intervals:  $ag-ag > ad_2-ad_2 > ad_3-ad_3 = ad_1-ad_1$ .

**Remarks:** The new species closely related to *Suctobelbella acutodentata* (HAMMER, 1979) comb.n., but is discriminated from the latter by the following points; (1) tectopedial fields widely separated from each other and many tubercles and short irregular ridges scattered between them, (2) genital plate with 5 setae, while 6 setae in the latter, (3) seta *ad*<sub>1</sub> inserted at a level of seta *an*<sub>1</sub>, but in the latter species situated at the level anterior to seta *an*<sub>2</sub>.

**Etymology:** The species was named after Dr. Hiroshi TAMURA, Professor emeritus of Ibaraki University, who gave me invaluable advice.

*Suctobelbella tumida* sp. n.

[Otahuku-madodani]

(Fig.58)

**Material examined:** Holotype (NSMT-Ac 11459); Mt. Yamizo, Ibaraki-ken. 28-IX-1981. S. CHINONE. From litter under forest of *Fagus crenata*, *Quercus mongolica grosseserrata*. --- 1 paratype (NSMT-Ac 11460): From litter of *Acer rufinerve* and *Fagus crenata*, the other data the same as the holotype. --- 1 ex. Mt. Kaba, Ibaraki-ken.

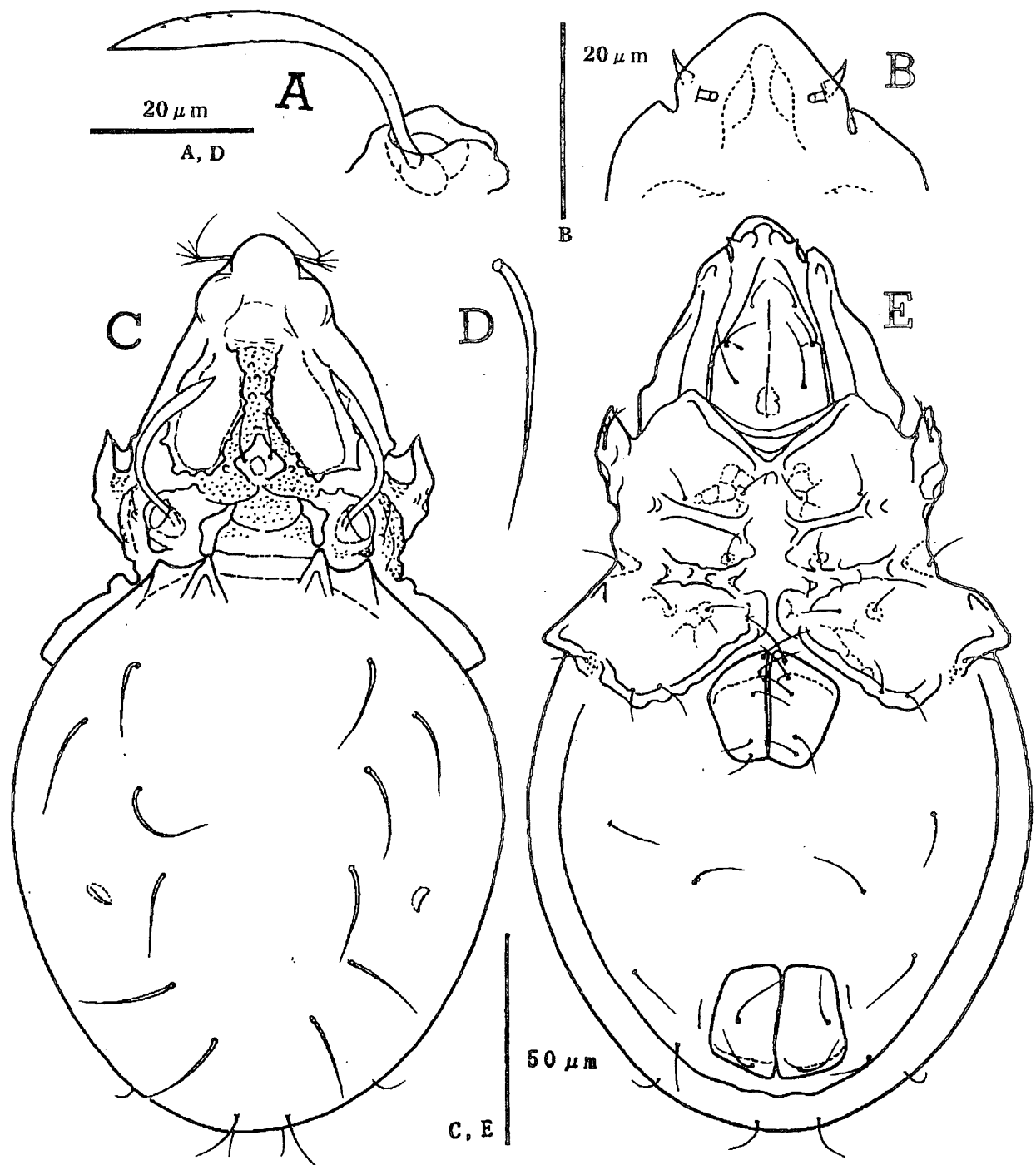


Fig.58: *Suctobelbella tumida* sp. n. --- A: Sensillus. B: Rostrum in dorsal view. C: Dorsal aspect. D: Notogastral seta. E: Ventral aspect.

9-V-1982. S. CHINONE. --- 1 ex. Mt. Adatara, Fukushima-ken. 30-VII-1985. S. CHINONE. From litter under grove of *Pinus pumila*. --- 1 ex. Nagaura-machi, Chiba-ken. 18-XII-1983. S. CHINONE. From litter under grove of *Castanopsis cuspidata*, *Machilus thunbergii* and *Cameria japonica*. --- 1 ex. Mt. Kengamine, 1590m above sea level, Yaita-shi, Tochigi-ken. 12-XI-1994. From litter under grove of *Picea bicalar*. --- 3 exs. Mt. Sanbe, Shimane-ken. 26-III-1972. S. CHINONE. From litter under forest of *Larix leptolepis*. --- 2 exs. Tsuwano-machi, Shimane-ken. 28-III-1972. S. CHINONE. From litter under grove of *Pinus densiflora* and *Cryptomeria japonica*.

**Measurements:** (in  $\mu\text{m}$ ,  $n=5$ ): Body length 200-232 (av. 215), width 100-132 (av. 116). Length of setae: *le* 14, *c* 20, *lm* 20, *lp* 25.

**Prodorsum:** Rostrum rounded and swollen on both sides. In ventral view, rostral tip slightly concave with a short rounded teeth bilaterally, followed by about 2 teeth: 1st one sharp and turned downwards, 2nd one thick and sometimes retuse at tip; a shallow incision between 1st and 2nd ones. Dorsal rostral area smooth. Tectopedial field oval in shape, with opened anterior margin. Lamellar knob rather triangular. The surface between tectopedial fields and around lamellar knob with some granules and tubercles. The head of sensillus very long, slender fusiform.

**Notogaster:** Notogaster oval in shape, 1.2 $\times$  as long as wide. Notogastral condyles short; *co.nm* triangular, *co.nl* keel-like. Nine pairs of dorsal setae: the setae slender, gently curved and moderately long except for *p*<sub>1</sub> and *p*<sub>2</sub> which are short; seta *c* not reaching the insertion of seta *lm*. Lyrifissure *im* situated obliquely at the level slightly posterior to seta *lp*. *RLN* of setae: *lm* 15, *lp* 18.

**Ventral aspect:** Epimeral cavity weakly developed. Setal formula of epimerata: 3-1-3-3. Genital plate 1.1 $\times$  as long as anal plate. Five pairs of genital setae: *g*<sub>1</sub> not so longer than the rest. Setae *ad*<sub>2</sub>, *ad*<sub>3</sub> and *ag* rather long. Relative length of setal intervals: *ag-ag* > *ad*<sub>2</sub>-*ad*<sub>2</sub> > *ad*<sub>1</sub>-*ad*<sub>1</sub> = *ad*<sub>3</sub>-*ad*<sub>3</sub>.

**Remarks:** The new species stands near to *Suctobelbella perforata* (STRENZKE, 1950), comb.n., but differs from the latter in the following points, (1) rostrum much swollen on both sides, (2) the head of sensillus very long, slender and fusiform, (3) notogastral condyles *co.nm* triangular.

## Type C ( 4 pairs of genital setae )

### Key to the Japanese species of the type C in the genus *Suctobelbella*

- 1(6) Tectopedial field with rather closed anteriorly. Prodorsum not so rounded ----- 2
- 2(3) Rostrum with 2 lateral teeth ----- 4
- 3(2) Rostrum with 3 lateral teeth -----  
----- *S. longisensillata* FUJITA et FUJIKAWA, 1987
- 4(5) Tectopedial field wide, with rounded lateral margin. Body small ----- *S. nitida* sp.n.
- 5(4) Tectopedial field elongated oval in shape. Body large ----- *S. singularis* (STRENZKE, 1950)
- 6(1) Tectopedial field opened anteriorly. Prodorsum roundish ----- *S. rotunda* sp.n.

### *Suctobelbella longisensillata* FUJITA et FUJIKAWA, 1987

[Enaga-madodani]  
(Fig.59)

*Suctobelbella longisensillata* FUJITA et FUJIKAWA, 1987, p.3, fig.8.

**Diagnosis:** Rostrum provided with a small notch and 3 lateral teeth on each side; the anterior tooth curved inward; the posterior tooth largest; all teeth pointed at the tip. Sensillus long, weakly thickened apically and terminating in a fine tip. Four pairs of genital setae. Body length: 208-219 $\mu\text{m}$ , width: 142-169 $\mu\text{m}$ .

**Distribution:** Japan.

### *Suctobelbella singularis* (STRENZKE, 1950)

[Kombo-madodani]  
(Fig.60)

*Suctobelba singularis* (STRENZKE): STRENZKE, 1951, p.156, Fig. 14.

*Suctobelbella singularis*: AOKI & FUJIKAWA, 1976, p.209.

**Material examined:** 4 exs.; Mt. Tatsuwara, Takahagi-shi, Ibaraki-ken. 19-VIII-1982. S. CHINONE. From litter under forest of *Quercus mongolica grosseserrata*. --- 3 exs.; Mt. Yamizo, Ibaraki-ken. 23-VIII-1980, 24-VII-1984, 13-VII-1986. S. CHINONE. From litter under grove of *Acer rufinerve*, *Fagus crenata* and *Q. mongolica grosseserrata*. --- 1 ex. Mt. Kaba, Ibaraki-ken. 27-VI-1986. S. CHINONE. From litter under

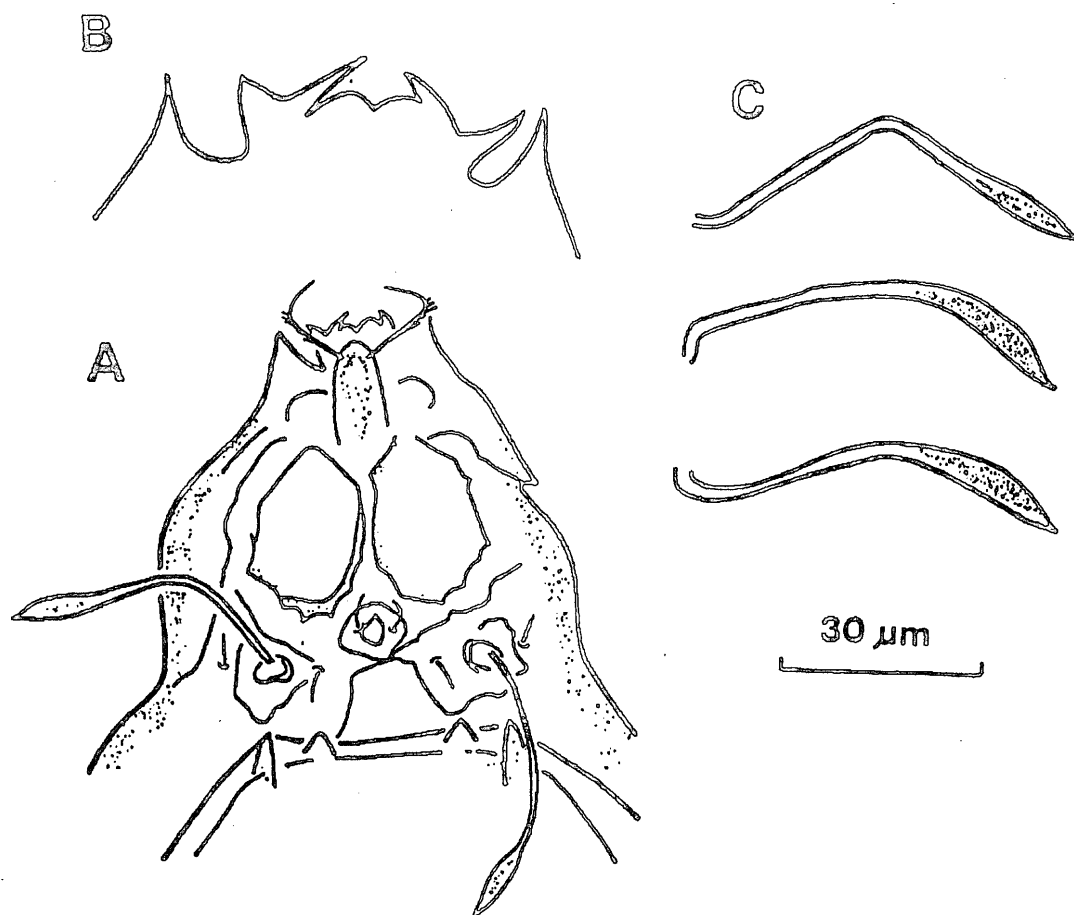


Fig.59: *Suctobelbella longisensillata* FUJITA et FUJIKAWA, 1987...A: Prodorsum, B: Rostral margin, C: Sensilli. (after FUJITA et FUJIKAWA, 1987)

grove of *Quercus acutissima* and *Q. serrata*. --- 2 exs. The Tanaeshiro Swamp, Fujisato-machi, Akita-ken. 27-VIII-1994. From litter under forest of *Fagus crenata* and *Pterocarya rhonifolia*. --- 1 ex. Tashiro-rindo, Kuriyama-mura, Tochigi-ken. 24-IX-1994. From litter under grove of *Fagus crenata*, *Quercus mongolica grosseserrata* and *Kalopanax pictus*.

**Measurements:** (in  $\mu\text{m}$ ,  $n=5$ ): Body length 243-265 (av.250), L/W 1.8. Length of setae (av.): *le* 15, *c* 17, *lm* 22, *lp* 21.

**Prodorsum:** Rostrum bridge-like, densely granulated with rather large granules. In ventral view, rostral tip medially concaved in a letter U with a short triangular teeth bilaterally, which turns downwards, followed by 1 thick, rather long teeth, a deep incision between them. Tectopedial field elongate oval in shape. Lamellar knob

roundish pentagonal. The surface between tectopedial fields and around lamellar knob granulated. Some tubercles found behind the rostrum and near the lamellar knob. A short transverse ridge with 3 tubercles just in front of bothridia. Sensillus with a long peduncle and short clavate or spindle-shaped head.

**Notogaster:** Notogaster oval in shape, 1.1 $\times$  as long as wide. Notogastral condyles rather well developed: *co.nm* short triangular; *co.nl* rather keel-like, extending backwards but not reaching the base of seta *c*; *co.nm* and *co.nl* connected by a short concave ridge. Nine pairs of dorsal setae; the setae setiform, medium long and gently curved, seta *c* not reaching the insertion of seta *lm*. *RLN* of setae: *lm* 14, *lp* 10.

**Ventral aspect:** Epimeral cavity not developed. Setal formula of epimerata: 3-1-3-3. Epimeral setae on epimera

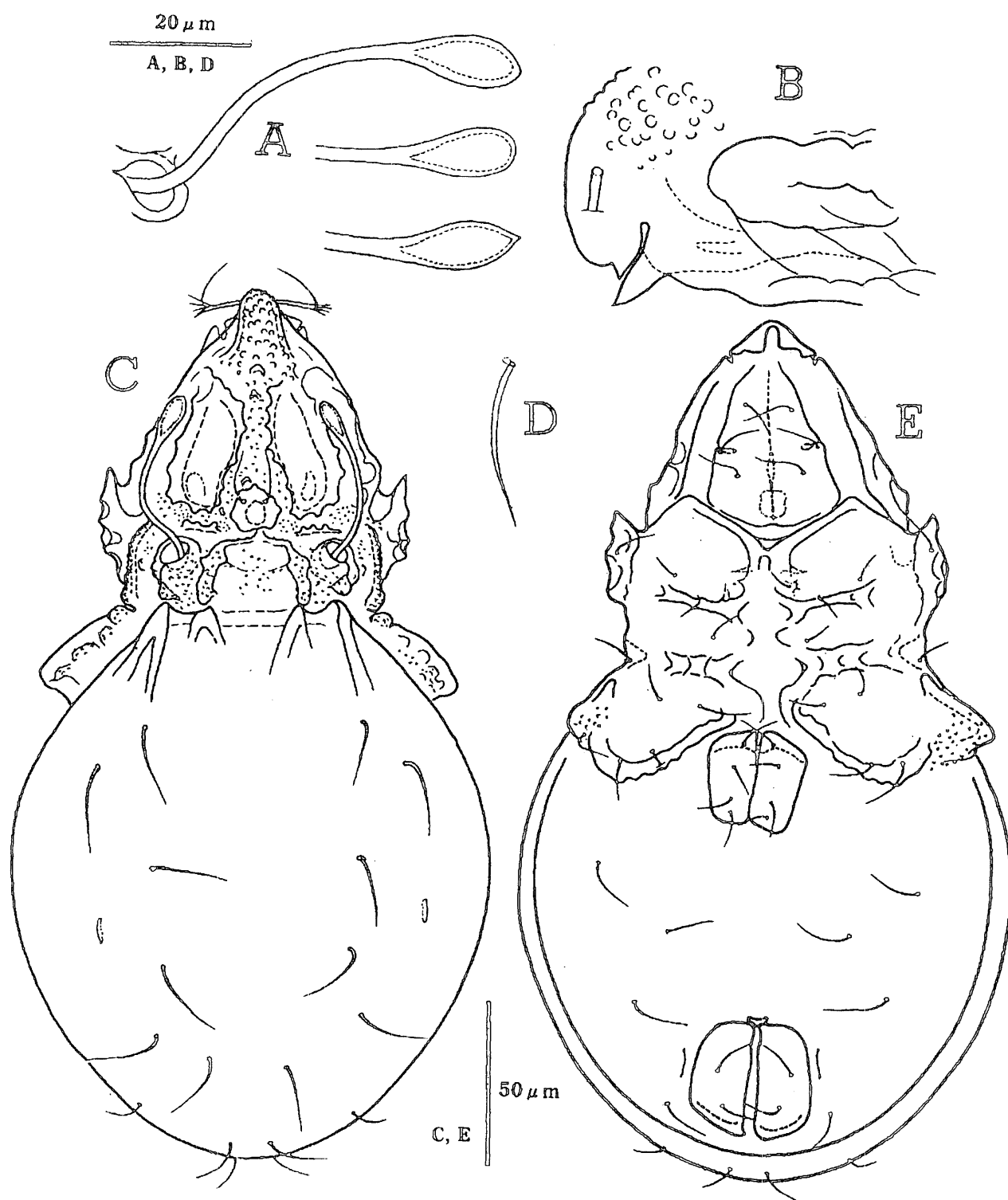


Fig.60: *Suctobelbella singularis* (STRENZKE, 1950) --- A: Sensillus. B: Rostrum in lateral view. C: Dorsal aspect. D: Notogastral seta. E: Ventral aspect.

III-IV rather long, about as long as genital setae. Four pairs of genital setae:  $g_1$  not longer than the rest. Genital plates smaller than the anal plates. Relative length of setal intervals:  $ag-ag>ad_2-ad_2>ad_1-ad_1=ad_3-ad_3$ .

**Remarks:** The Japanese specimens well accord with the description of *Suctobelbella singularis* (STRENZKE, 1950), but differ from the original description in the shape of sensillus: in Japanese ones sensillar head show some variations as Fig.60-A.

**Distribution:** Germany and Japan.

***Suctobelbella nitida* sp. n.**

[Koro-madodani]

(Fig.61)

**Material examined:** Holotype (NSMT-Ac 11461); Tamada, Asahi-mura, Ibaraki-ken. 9-V-1979. S. CHINONE. From litter under grove of *Pinus thunbergii*.--- 2 paratypes (NSMT-Ac 11462 and 11463): the same data as the holotype. --- 1 ex. Uematsu, Hazaki-machi, Ibaraki-ken. 6-VII-1979. S. CHINONE. From litter under grove of *P. densiflora*. --- 3 exs. Mt. Hanakame, Ibaraki-ken. 23-VIII-1984. S. CHINONE. From litter under deciduous broad-leaved forest. --- 1 ex. Narage, Ono-mura, Ibaraki-ken. 6-VII-1979. S. CHINONE. From litter under grove of *Pinus densiflora*.--- 2 exs. Kurosawa, Ome-shi, Tokyo-to. 29-X-1997. J. AOKI. From litter under grove of *Cryptomeria japonica*. --- 1 ex. Near the Lake Mashu, Hokaido. 29-VII-1983. From moss under grove of *Betula ermani* and *Picea jezoensis*. --- 1 ex. The foot of Mt. Hayachine, Kawai-mura, Iwate-ken. 7-VIII-1973. S. CHINONE. From litter under grove of *Quercus mongolica grosseserrata*, *Fagus crenata* and maple tree. --- 8 exs. Masaki, Taro-cho, Iwate-ken. 8-VIII- 1973. S. CHINONE. From litter under grove of *Pinus densiflora*. --- 1 ex. Mt. Kengamine, 1590m above sea level, Yaita-shi, Tochigi-ken. 12-XI-1994. From litter under grove of *Picea bicolor*. --- 1 ex. The Bunao Pass, Toyama-ken. 6-X-1996. Y. HIRAUCHI. From litter under forest of *Fagus crenata*. --- 3 exs. Yuhoinone, Toyama-ken. 1-VII-1997. Y. HIRAUCHI. From litter under forest of *Fagus crenata*. --- 1 ex. Higashimatadani, Uotsu-shi, Toyama-ken. 12-IV-1998. Y. HIRAUCHI. From litter under forest of *Cryptomeria japonica*. --- 1 ex. Mt. Sanbe, Shimane-ken. 26-III-1972. S. CHINONE. From litter under grove of *Larix leptolepis*. --- 1 ex. Kubokawa-machi, Kochi-ken. 23-X-1980. S. CHINONE. From litter under grove of *Castanopsis*

*cuspidata*, *Castanopsis*. sp., *Cinnamomum camphora*.

**Measurements:** (in  $\mu\text{m}$ ,  $n=5$ ): Body length 190-225 (av. 207), width 110-130 (av. 120), L/W 1.7. Length of setae (av.):  $le$  14,  $c$  14,  $lm$  15,  $lp$  16.

**Prodorsum:** Rostrum rounded and granulated weakly. In ventral view, rostral tip medially concaved like a letter U with a short triangular tooth bilaterally, followed by 1 thick long tooth. A deep incision between 1st and 2nd teeth. Tectopedial field wide and oval in shape. Lamellar knob rather pentagonal with sharp anterior apex. Some vertical short ridges found behind the rostrum. The area between tectopedial fields and around lamellar knob scattered with many small granules and tubercles densely. Sensillus has a very long, sinuate peduncle and its head short, spindle-shaped with a few bristles at tip.

**Notogaster:** Notogaster roundish,  $1.0\times$  as long as wide. Notogastral condyles well developed;  $co.nm$  triangular,  $co.nl$  keel-like, their posterior ends not reaching the level of setae  $c$ . Nine pairs of dorsal setae: the setae smooth, rather short and gently curved; seta  $lm$  not reaching the insertion of seta  $lp$ .  $RLN$  of setae:  $lm$  12.  $lp$  13.

**Ventral aspect:** Epimeral cavity not developed. Setal formula of epimerata: 3-1-3-3. Epimeral seta  $4a$  and  $4b$  rather long. Four pairs of genital setae: the setae shorter than the anal setae,  $g_1$  as long as the other genital setae. Genital plate  $1.1\times$  as long as anal plate. Relative length of setal intervals:  $ag-ag>ad_2-ad_2>ad_3-ad_3=ad_1-ad_1$ .

**Remarks:** The new species is very similar to *Suctobelbella longisensillata* FUJITA et FUJIKAWA, 1987. The former, however, differs from the latter in the shape of lateral teeth of rostral margin. The new species is also closely related to *Suctobelbella loksai* (BALOGH et MAHUNKA, 1981), comb. n. but the shape of rostral area and of the notogastral condyles are different. The new species is characterized by the following points, (1) rostrum concaved and weakly granulated, (2) the shape of rostral teeth: 1st one short and 2nd one long with sharp tip, (3) sensillus has a long sinuate peduncle and a short spindle-shaped head, (4) the shape of rather developed notogastral condyles.

***Suctobelbella rotunda* sp. n.**

[Maru-madodani]

(Fig.62)

**Material examined:** Holotype (NSMT-Ac 11464); Narage, Ohno-mura, Ibaraki-ken. 6-VII-1979. S. CHINONE.



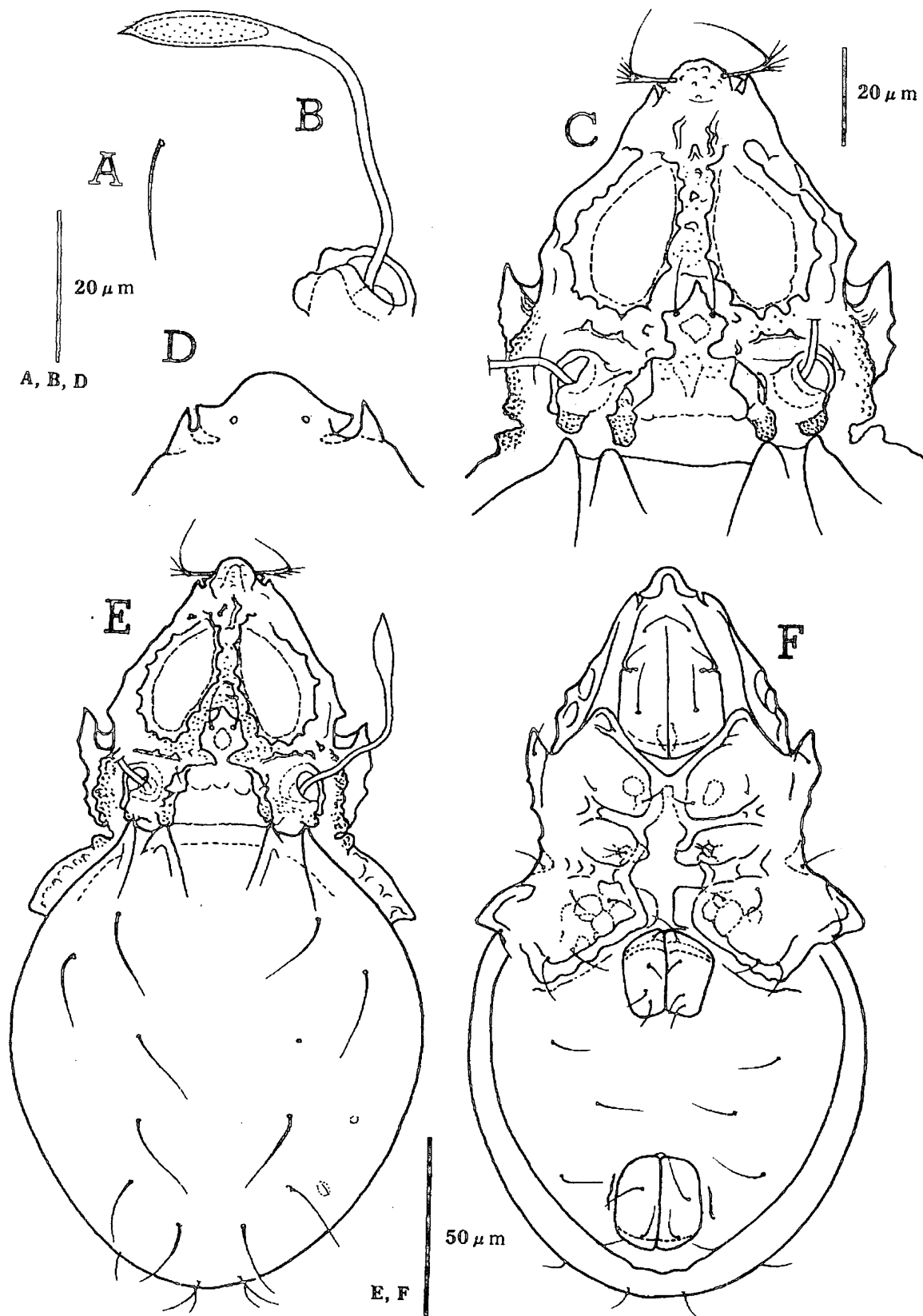


Fig.61: *Suctobelbella nitida* sp. n.--- A: Notogastral seta. B: Sensillus. C: Prodorsum in dorsal view. D: Rostral teeth. E: Dorsal aspect. F: Ventral aspect.

From litter under grove of *Pinus densiflora*. --- 4 paratypes (NSMT-Ac 11465 to 11468); the same data as the holotype. --- 2 exs. Kakuzaki, Shintone-mura, Ibaraki-ken. S. CHINONE. From litter under grove of *P. densiflora*. --- 1 ex. Kodaka, Aso-machi, Ibaraki-ken. 6-VII-1979. S. CHINONE. From litter under grove of *P. densiflora*.

**Measurements:** (in  $\mu\text{m}$ ,  $n=5$ ): Body length 190-205 (av. 197), width 115-125 (av. 121), L/W 1.6. Length of setae (av.): *le* 16, *c* 16, *lm* 16, *lp* 16.

**Prodorsum:** Prodorsum rather roundish. Rostrum smooth and rounded. In ventral view, rostral tip medially concaved and bilaterally with a short triangular tooth which turns downwards, followed by about 3 teeth: 1st one thick and truncate, sometimes emarginated; 2nd and 3rd ones conical and touching each other. Tectopedial field wide, with opened anterior margin. Some tubercles found between tectopedial fields. Lamellar knob rather large, triangular in shape. Sensillus has a long, sinuate peduncle and short clavate head with some short bristles at tip.

**Notogaster:** Notogaster rounded,  $1.0\times$  as long as wide. Notogastral condyles rather well developed; *co.nm* small triangular, *co.nl* keel-like, reaching the insertion of seta *c*. Nine pairs of dorsal setae: the setae fine setiform, gently curved and medium long; seta *c*  $0.5\times$  as long as the interval of *c-lm*. *RLN* of setae: *lm* 14, *lp* 14.

**Ventral aspect:** Epimeral cavity not developed. Setal formula of epimerata: 3-1-3-3. Genital plate  $1.1\times$  as long as anal plate. Four pairs of genital setae: the setae as short as epimeral setae and shorter than the other ventral setae. Relative length of setal intervals:  $ag-ag>ad_2-ad_2>ad_1-ad_1=ad_3-ad_3$ .

**Remarks:** The new species can be distinguished from its close relatives by the following points: (1) prodorsum roundish (2) sensillus with a very long peduncle and short clavate head, (3) the shape of rostrum and rostral teeth.

## V Systematical Survey of the World Genera

### 1 Phylogenetic Relationship of Genera

Until now 20 genera of the family Suctobelbidae had been reported worldwide. In addition to these 20, four new genera from Japan were established in the present study, and so 24 genera are now regarded here as comprising the genera of the family Suctobelbidae. A

systematical survey of the previously recognized 20 genera is provided here, except for two genera, *Discosuctobelba* and *Flagrosuctobelba*, which are regarded as junior synonyms of *Suctobelbella*, and another two genera, *Sucteremaeus* and *Ussuribata*, of which descriptions were not available to the author.

The main morphological characters used here are as follows: (1) the number of notogastral setae, (2) the number of genital setae, (3) the shape of the anterior margin of notogaster, (4) the shape of the tectopedial field, (5) the shape of the lamellar knob, (6) the shape of rostral setae, and (7) body size.

The number of notogastral setae are usually 8, 9, 10, 11 or 12 pairs. Generally, the number has a tendency to decrease in the higher groups of oribatid mites (BALOGH & MAHUNKA, 1988). The numbers of genital setae show the same tendency. The shapes of the anterior margin of notogaster are classified into three types: a 1st type with a smooth margin (the primitive species), a 2nd type with low swellings and a 3rd type with condyles of 1 pair or 2 pairs. If two pairs are present, it is important to note which condyles are more developed. Most genera of the family Suctobelbidae have one pair of tectopedial fields of various shapes. In some primitive genera, the tectopedial fields are reduced or visible only by their outer edges. The lamellar knob is a remarkable feature in suctobelboid mites. One pair of lamellae is lath-shaped and long in most of oribatid families, but in the Suctobelbidae they are fused into a small and conical lamellar knob. The lamellar knobs are classified into the following three types: (1) swelling absent or small, (2) two small knobs present, each with a seta *le*, (3) one small angular knob with a pair of setae *le*. Rostral setae are usually bent knee-like, but in some primitive genera they are straight or gently curved. The mites of the family Suctobelbidae generally have small-sized bodies compared with the closely related family Oppiidae and besides, they tend to become smaller.

Based on the characters mentioned above, a phylogenetic relationship among the genera of the family Suctobelbidae is suggested as shown in Fig.63. The main route of the phylogenetic relationships is  $A \rightarrow B \rightarrow E \rightarrow F \rightarrow N$ . This route depends on the following characters: (1) the shape of anterior margin of notogaster; smooth  $\rightarrow$  low swellings  $\rightarrow$  two pairs of condyles, (2) decrease in body size, (3) reduction in the number of dorsal setae and

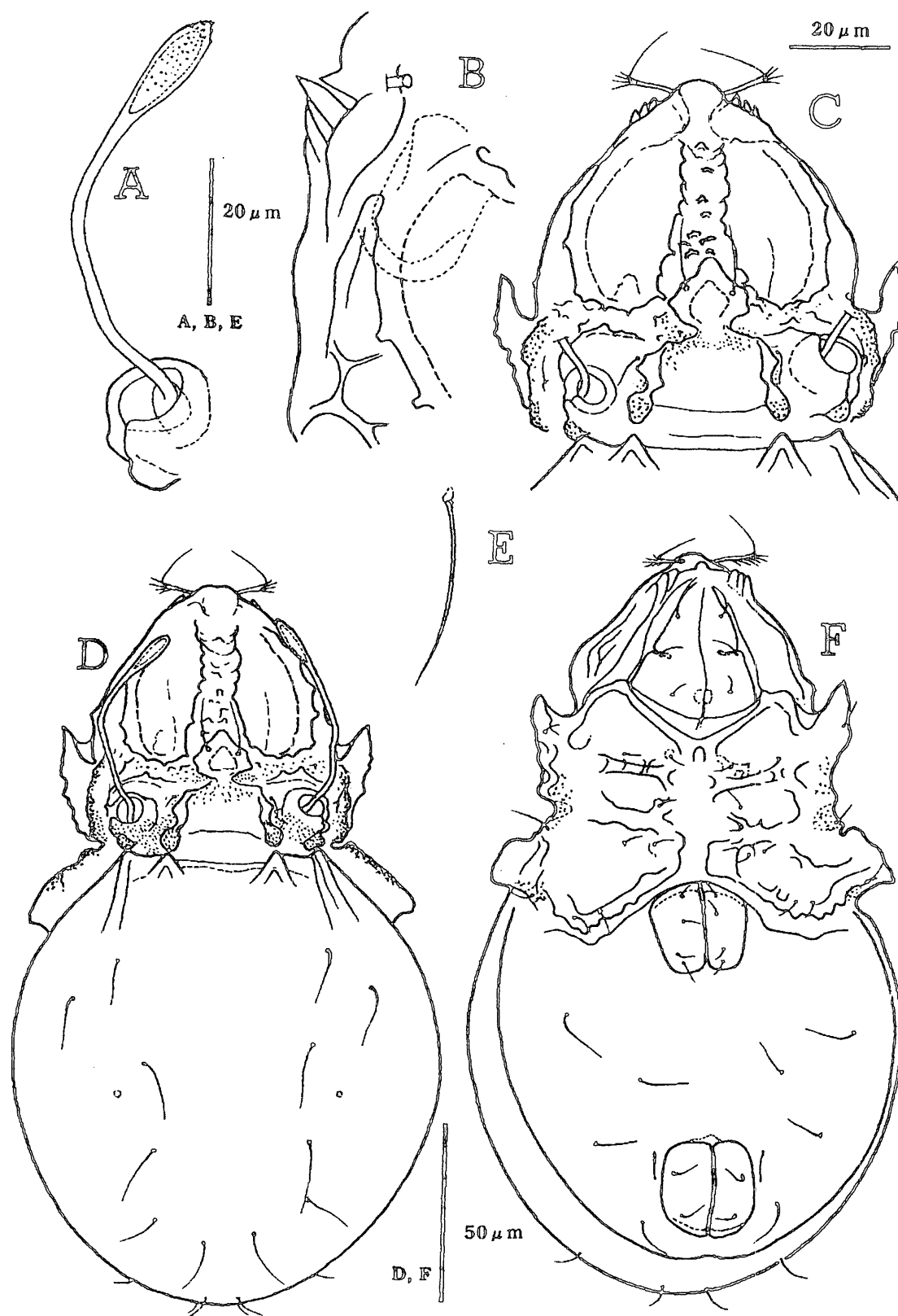


Fig.62: *Suctobelbella rotunda* sp. n. --- A: Sensillus. B: Rostral teeth. C: Prodorsum in dorsal view. D: Dorsal aspect. E: Notogastral seta. F: Ventral aspect.

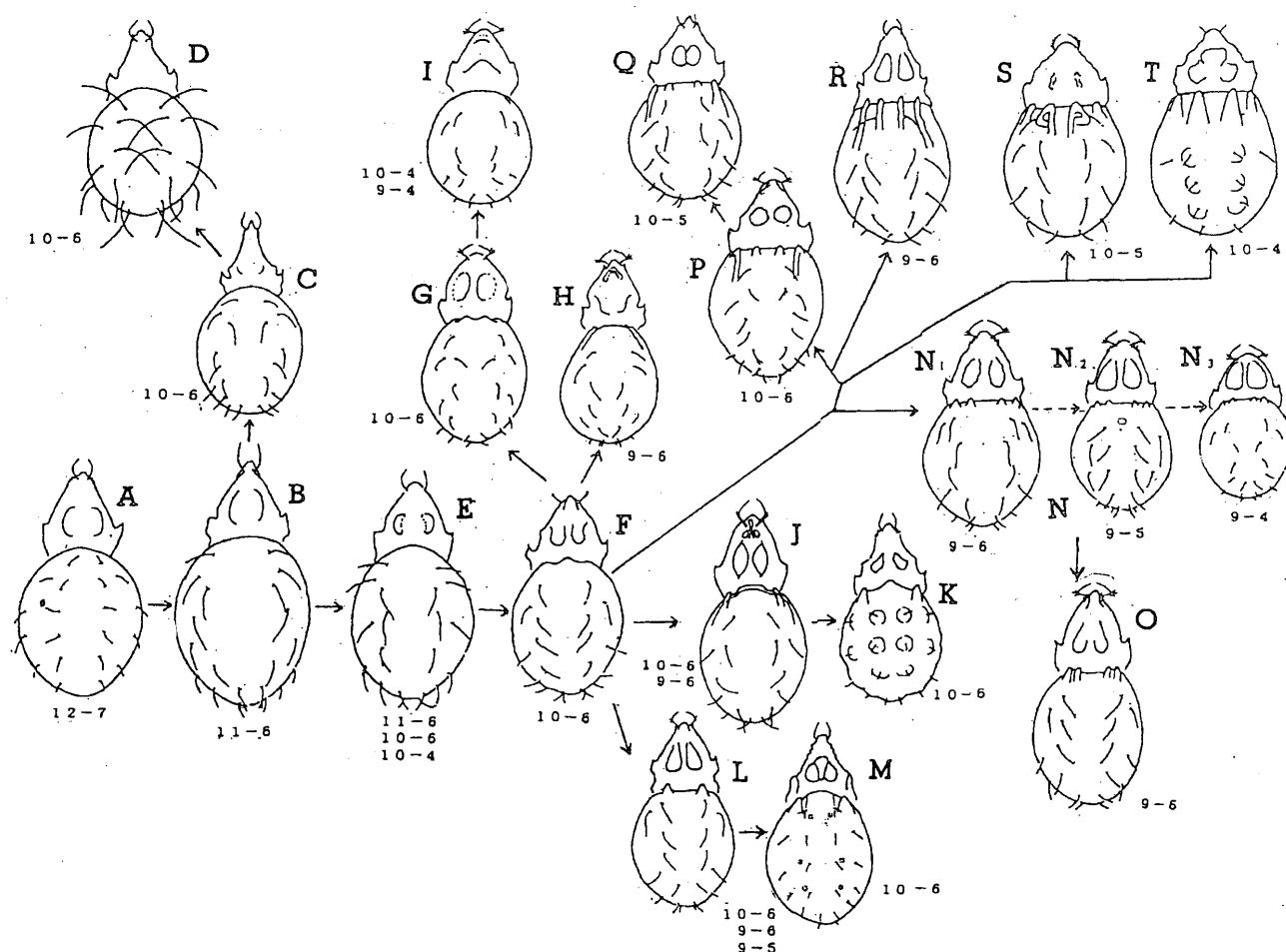


Fig.63: Phylogenetic relationships of the genera of the family Suctobelbidae---A: *Parisuctobelba*, B: *Rhynchobelba*, C: *Rhinosuctobelba*, D: *Rhynchoppia*, E: *Allosuctobelba*, F: *Suctobelba*, G: *Kathetosuctobelba* gen. n., H: *Fenestrobella*, I: *Neosuctobelba*, J: *Suctobelbata*, K: *Suctobelbila*, L: *Novosuctobelba*, M: *Serratobelba*, N: *Suctobelbella* (N1: Type A, N2: Type B, N3: Type C), O: *Leptosuctobelba* gen. n., P: *Kuklosuctobelba* gen. n., Q: *Zeasuctobelba*, R: *Niosuctobelba* gen. n., S: *Parasuctobelba*, T: *Suctobelbiloides*.

\* The number by figures means the number of notogastral, dorsal setae and genital setae: eg. 10-6= dorsal setae 10 pairs and genital setae 6 pairs.

genital setae, (4) the formation of tectopedial field. In these characters the shape of anterior margin of notogaster and the shape of tectopedial field are regarded as the most important characters for the phylogenetic relationship. The route A→B→E→F depends on the formation of tectopedial field, a reduction in the number of dorsal setae and formation of original form of condyles. The route B→C→D shows elongation of the rostrum and reduction of the tectopedial field. The route F→G→I shows

reduction of the tectopedial field. The root F→H shows a presence of a V-shaped depression of the rostrum. The route F→J→K shows 1 pair of condyles and 1 unpaired swelling or projection on median anterior margin of notogaster. Further, K has some pairs of excrescences or depressions on the notogastral surface. F→L→M is a development of a pair of condyles. M has an elevated median area with a truncate anterior margin between tectopedial fields. The groups P, Q, R, S and T

*co.nm* is larger than *co.nl*. P and Q have small, circular tectopedial fields, which, however, meet each other in Q. R has long keel-like condyles. *Co.nm* of S shows a complicated structure. T has three angulated large elevated areas on the posterior surface of the prodorsum. N has rather short condyles. *Co.nm* and *co.nl* of N are about equal in size. The route N 1 → N 2 → N 3 tends to reduce the number of genital setae (6 → 5 → 4), and of body size. Notogastral condyle *co.nm* and *co.nl* are closely situated and connected basally in O.

## 2 Worldwide Distributions of Genera

After considering the phylogenetic relationship, the 20 genera were divided into four groups: 'primitive' genera (A, B, C, E), 'somewhat primitive' and 'standard' genera (F, J), 'prosperous' genus (N) and 'evolved' genera (D, G, I, H, K, L, M, O, P, Q, R, S, T).

Figure 64 shows the distribution of the 'primitive' genera, which are distributed in the Northern Hemisphere, mainly in Europe and North America. Figure 65 means the Holarctic distribution of the 'somewhat primitive' and 'standard' genera and Fig. 66 shows the distribution of the single 'prosperous' genus, which is distributed worldwide. The most 'evolved' genera are shown in Figure 67 and are distributed in the Southern Hemisphere.

From these distributions, it is reasonable to conclude that the original habitat of suctobelboid mites was in the Northern Hemisphere (perhaps North America or Europe) and the mites should have gradually invaded the Southern Hemisphere.

## VI Summary

The present study aimed to: 1) arrange and record thoroughly all species of the family Suctobelbidae (Acari: Oribatida) from Japan; and 2) phylogenetically survey of the world genera.

Presently in Japan the family Suctobelbidae contains 59 species and three subspecies belonging to 10 genera. Of the species dealt with here, four genera, 41 species and one subspecies are newly described and six species are newly recorded from Japan.

In 1992, J. BALOGH & P. BALOGH assigned 19 genera from around the world to the family Suctobelbidae. In addition to these, four new genera from Japan were established in the present study. However, it is proposed here that the following 20 genera are now recognized as belonging to the family Suctobelbidae. A: *Parisuctobelba* HIGGINS et WOOLLEY, 1976, B: *Rhynchobelba* WILLMANN, 1953, C: *Rhinosuctobelba* WOOLLEY, 1969, D: *Rhynchoppia* BALOGH, 1968, E: *Allosuctobelba* MORITZ, 1970, F: *Suctobelba* PAOLI, 1908, G: *Kathetosuctobelba* gen.n., H: *Fenestrobilba* BALOGH, 1970, I: *Neosuctobelba* BALOGH et MAHUNKA, 1969, J: *Suctobelbata* GORDEEVA, 1991, K: *Suctobelbilla* JACOT, 1937, L: *Novosuctobelba* HAMMER, 1977, M: *Serratobelba* MAHUNKA, 1984, N: *Suctobelbella* JACOT, 1937, O: *Leptosuctobelba* gen.n., P: *Kuklosuctobelba* gen.n., Q: *Zeasuctobelba* HAMMER, 1966, R: *Niosuctobelba* gen.n., S: *Parasuctobelba* HAMMER, 1977, and T: *Suctobelbiloides* MAHUNKA, 1988.

The systematic relationships between these 20 genera was also discussed. The main characters of the genera are characterized as follows: 1) the number of dorsal setae of notogaster, 2) the number of genital setae, 3) the shape of the anterior margin of the notogaster, 4) the state of tectopedial field, 5) the state of lamellar knobs, and 6) body size. Based on these characters, the phylogenetic relationship of the genera was constructed as shown in Fig. 63. In this relationship, *Parisuctobelba* (A) occupies the most primitive position, and *Suctobelbella* (N) seems to occupy the most advanced position.

These 20 genera were then divided into 4 groups: 'primitive' genera (A, B, C, E), 'somewhat primitive' and 'standard' genera (F, J), a 'prosperous' genus (N) and most 'evolved' genera (D, G, I, H, K, L, M, O, P, Q, R, S, T). Figures 64 to 67 show the distribution of the four groups of the genera. From these distributional patterns, it was surmised that the original habitat of suctobelbid mites was in the Northern Hemisphere (probably, North America or Europe) and the mites gradually expanded their distributional area to the Southern Hemisphere.

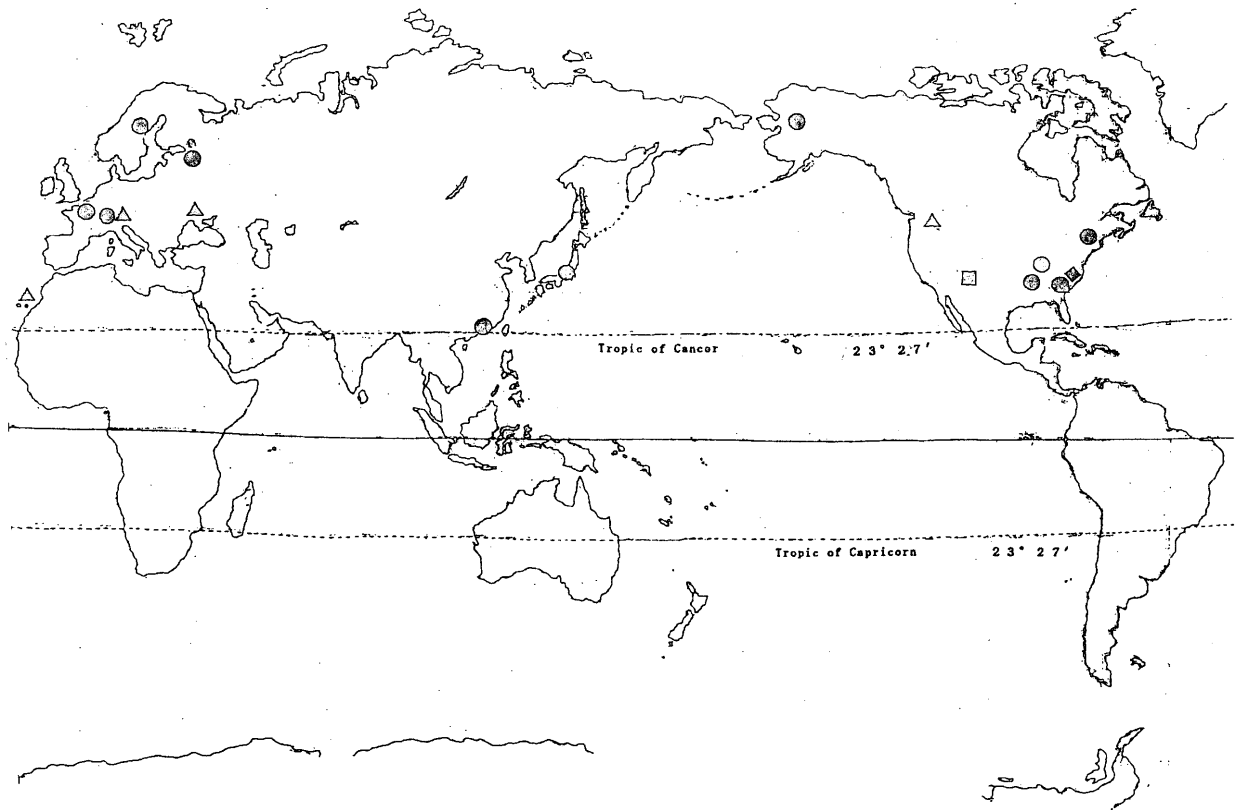


Fig. 64: Distribution of primitive genera... (A): *Parisuctobelba*, (B): *Rhynchobelba*, (C): *Rhinosuctobelba*, (E): *Allosuctobelba*

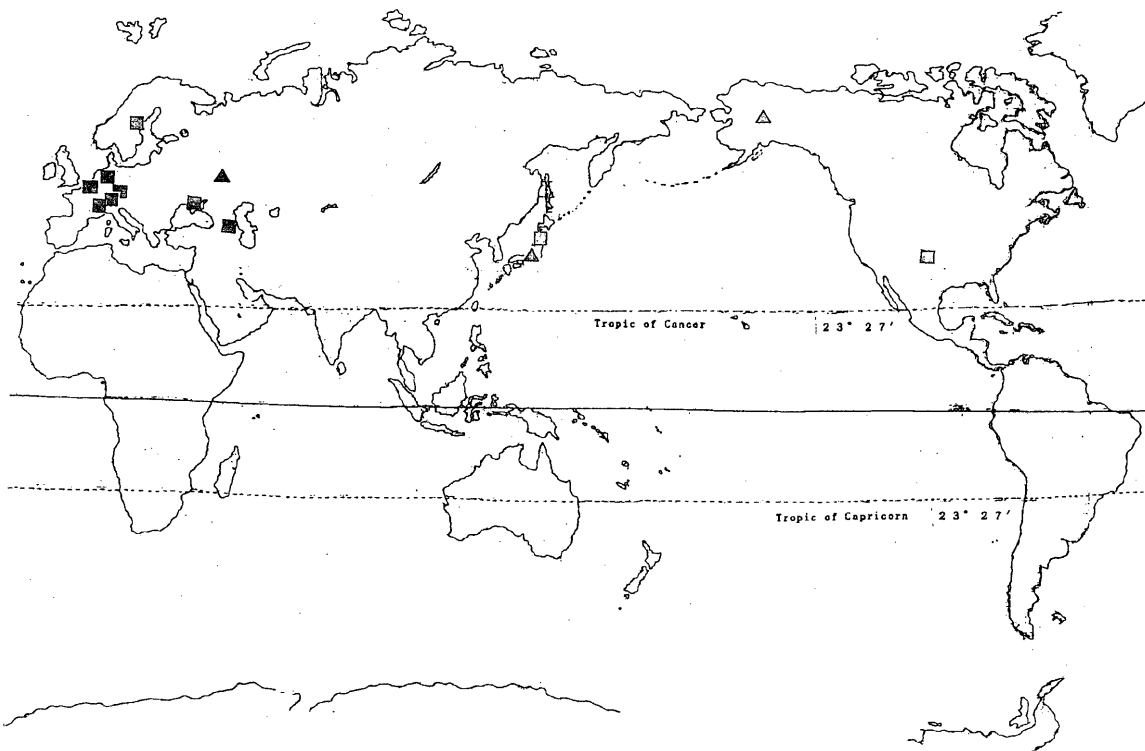


Fig. 65: Distribution of somewhat primitive and standard genera... (F): *Suctobelba*, (J): *Suctobelbata*

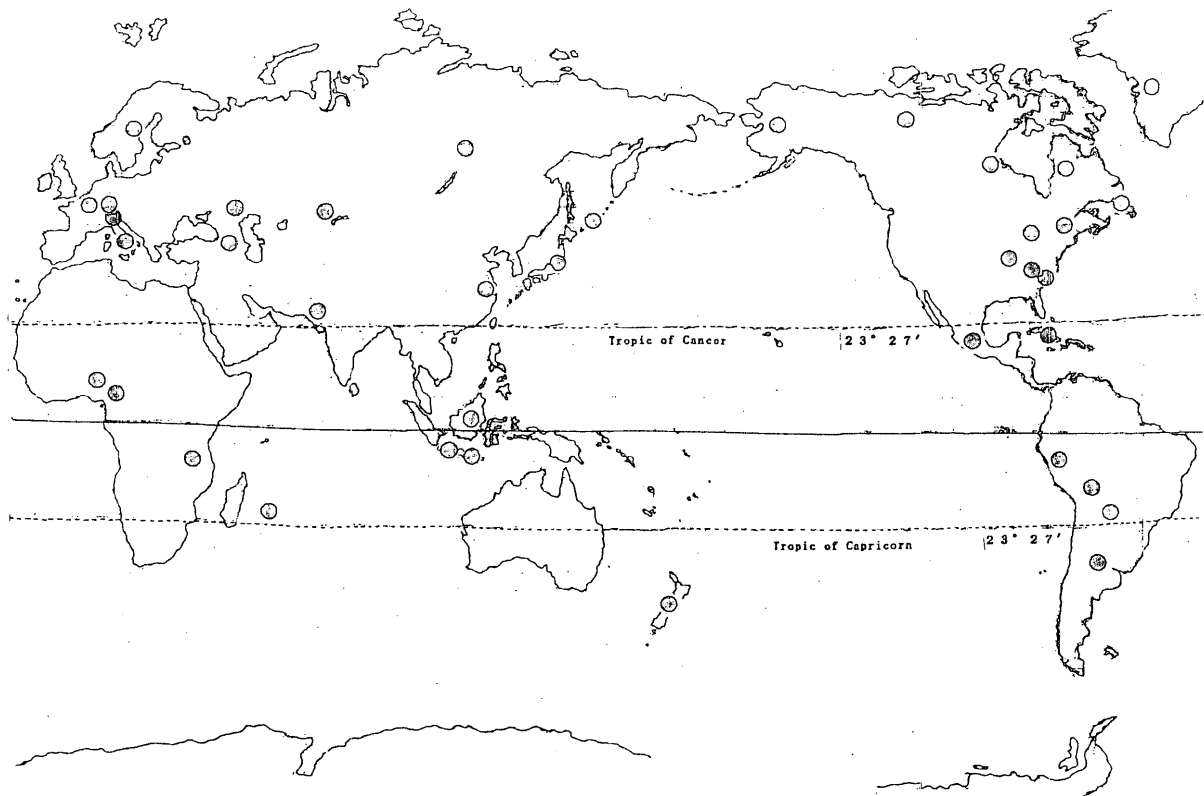


Fig. 66: Distribution of prosperous genus... (N): *Suctobelbella*

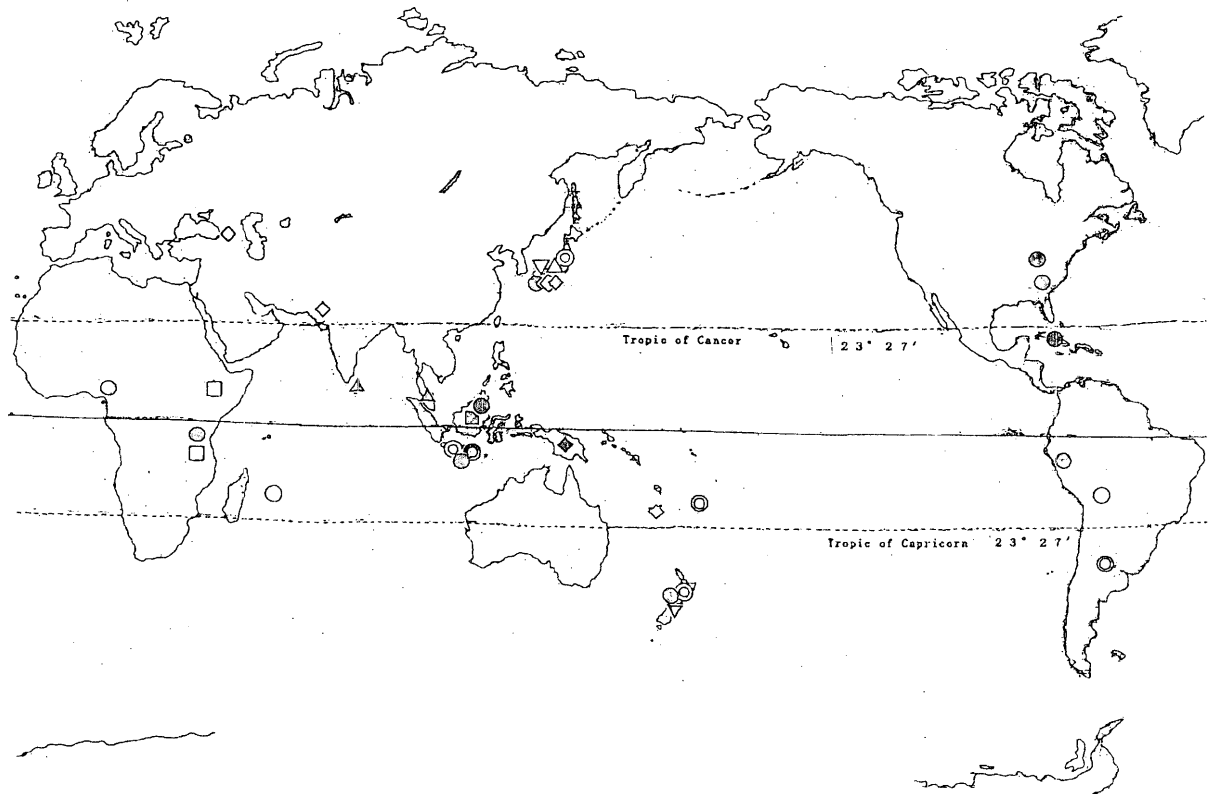


Fig. 67: Distribution of most evolved genera ... (D): *Rhynchoppia*, (G): *Kathetosuctobelba*, (I): *Neosuctobelba*, (H): *Fenestrobilba*, (M): *Serratobelba*, (O): *Leptosuctobelba*, (P): *Kuklosuctobelba*, (Q): *Zeasuctobelba*, (R): *Niosuctobelba*, (S): *Parasuctobelba*, (T): *Suctobelbiloides*, (K): *Suctobelbilla*, (L): *Novosuctobelba*

# 摘 要

茅根重夫（茨城県自然博物館 〒306-0622 岩井市大崎 700）：日本産マドダニ科に属する土壌性ダニ（ササラダニ類）の分類

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本報告は、1) 日本産のマドダニ科に属する種の記載及び記録の整理、2) 世界のマドダニ科の属の系統的解析を考察したものである。本報告では日本産マドダニ科に属する種として 10 属 59 種 3 亜種が取り上げられ、その内、4 属が新属、41 種 1 亜種が新種・新亜種で、6 種が新記録種となる。

次に、マドダニ科に属する世界の属の系統解析をおこなった。1992 年にハンガリーの J. BALOGH & P. BALOGH はマドダニ科に所属する属として 19 の属を挙げたが、著者はその中から 4 属 (*Suteremaeus*, *Ussuribata*, *Discosuctobelba*, *Flagrosuctobelba*) を除き、新たに 5 属を加えて、以下のような 20 属について系統解析を試みた。

A: *Parisuctobelba* HIGGINS et WOOLLEY, 1976

B: *Rhynchobelba* WILLMANN, 1953

C: *Rhinosuctobelba* WOOLLEY, 1969

D: *Rhynchoppia* BALOGH, 1968

E: *Allosuctobelba* MORITZ, 1970 [オオマドダニ属]

F: *Suctobelba* PAOLI, 1908 [マドダニ属 (和名新称)]

G: *Kathetosuctobelba* gen. n. [フクレマドダニ属 (和名新称)]

H: *Fenestrobela* BALOGH, 1970

I: *Neosuctobelba* BALOGH et MAHUNKA, 1969

J: *Suctobelbata* GORDEEVA, 1991 [ゴマフリマドダニ属 (和名新称)]

K: *Suctobelbila* JACOT, 1937 [マドダニモドキ属]

L: *Novosuctobelba* HAMMER, 1984 [カタハリマドダニ属 (和名新称)]

M: *Serratobelba* MAHUNKA, 1984

N: *Suctobelbella* JACOT, 1937 [トゲマドダニ属 (和名改称)]

O: *Leptosuctobelba* gen. n. [ナガマドダニ属 (和名新称)]

P: *Kuklosuctobelba* gen. n. [メガネマドダニ属 (和名新称)]

Q: *Zeasuctobelba* HAMMER, 1966

R: *Niosuctobelba* gen. n. [ニオウマドダニ属 (和名新称)]

S: *Parasuctobelba* HAMMER, 1977

T: *Suctobelbiloides* MAHUNKA, 1988

系統を考察する上で重視した主な形質は、1) 後

体部の背毛の数、2) 生殖毛の数、3) 後体部前縁の形 (突起の有無・数)、4) 窓状構造の状態、5) 桁結節の形、6) 体の大きさ等である。これらの形質をもとに属の系統図を考えた。他のササラダニ類でも、高等になるにつれて、後体部背毛や生殖毛の減少が見られることから、マドダニ科でも同様と考えて、最も、背毛・生殖毛の多い A (*Parisuctobelba*) を最も原始的な位置に置き、マドダニ科としての特徴を多く備え、種数が最も多い N (*Suctobelbella*) を進化の安定した位置に配置した。

この系統図上の属群を 4 つのグループ、即ち、原始的な属 (A, B, C, E)・やや原始的で一般的な属 (F, J)・最も繁栄している属 (N)・より進化した属 (D, G, I, H, K, L, N, O, P, Q, R, S, T) に分けて、地図上にプロットしてみた。その結果、原始的な属は北半球のみに分布し、最も繁栄している属は南北両半球に広く分布、より進化したと思われる属は主として南半球に分布していることが分かった。これらのことから、マドダニ科の種は北半球 (多分、アメリカ大陸かヨーロッパ大陸) で発生し、南半球に分布を広げたと推察することができる。

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